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FARMING IN A SMALL WAY

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IN A SMALL WAY

BY

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AUTHOR OF

'POULTRY FOR PRIZES AND PROFIT' 'THE GOAT' ETC

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PREFACE.

FEW words of apology are needed in offering a book of this nature to the public. There is an ever-increasing class of persons who, averse to trade and the bustle of a town, prefer a country life, converting labour into pleasure among their gardens, their fields, and their live stock. The production of members of such a class may not compare individually with that of the ordinary farmer; but it is of a more important and varied nature, and attains the same end without either the outlay of so much capital or the necessity of so much land. 'Farming in a small way,' although it will assist those whose object is to obtain their livelihood upon a similar plan, is written rather for the assistance of the many who are anxious to add to their comforts, their pleasures, and their incomes with little more than the expenditure of time and common sense, and if in any degree it attains this end, the

author will be satisfied. In most of the few cases in which quotations have been made the authority has been given; in the others, including some of the tables, which will be found most useful, the author's name is unknown. The tables of measures, &c., are principally taken from the 'Gardener's Almanac.'

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CONTENTS.

CHAPTER		PAGE
I.	COUNTRY LIFE	1
II.	SELECTION OF HOMESTEAD	9
III.	LABOUR	18
IV.	THE HORSE AND HIS MANAGEMENT	35
V.	COWS AND CALVES	52
VI.	THE PIG	79
VII.	POULTRY	92
VIII.	THE POULTRY FARM	127
IX.	PIGEONS	141
X.	THE DOG	155
XI.	FERRETING	164
XII.	RABBITS, TAME AND WILD	173
XIII.	RATS AND RATTING	181
XIV.	THE DAIRY	186
XV.	THE ARABLE LAND	219
XVI.	THE GARDEN AND ORCHARD	257
XVII.	MANURES	299
XVIII.	FENCES, HEDGES, AND TIMBER	313
XIX.	HAY AND HAY-MAKING	321
XX.	BEE KEEPING	331
XXI.	THE HOUSEHOLD	347
XXII.	MISCELLANEOUS	355

FARMING IN A SMALL WAY.

CHAPTER I.

COUNTRY LIFE.

ALTHOUGH one to two works have been written dealing in some degree with the pursuits which are connected with the subject of our title, yet we believe there is no single one which is in any sense comprehensive, which professes to deal completely with the whole system, or which even treats many of its branches in anything more than general or theoretical terms. In the following pages we shall not tell our readers that we have made, or others reaped, enormous profits from our live stock, our crops, or our dairy; but we shall show them how they may, with little capital, a fair share of intelligence, and an abundance of energy and perseverance, enjoy the innumerable pleasures and luxuries of a country life and its concomitant blessings—blessings which are health-giving, which are inestimable in the rearing and education of a family—how they may live in a

sphere of comfort and social dignity quite impossible in a town with a much larger capital, and how, indeed, they may reap a highly respectable profit, and all from pursuits which are neither laborious nor irksome, but rather full of pleasure and anticipation. In the pursuit of profit a country life demands intelligence and thought, rather than manual labour, and a steady watchfulness with the master's ever-present eye than an outlay of capital. At times it has its anxieties and disappointments as well as its seasons of success. Where there are live animals individuals are prone to forget all about the possibilities of loss in their calculations. We have seen many plausible balance sheets in which credit is taken for 'the annual calf' from each cow, and finally the value of the cow herself when she ceases to prove a source of profit; whereas any practical man can tell us that cows often miss their calves and as often die. It is the same with pigs and all other live stock. The fearful season of 1879 stands as a record that corn, roots, and hay are sometimes sources of loss, and therefore we need do no more than point out that even country life is not all *couleur de rose*, but that the man who is the most careful and persevering is certain to do well in ordinary seasons and feel a minimum of loss in seasons such as the past. We have had our share of both, and our experience of 1879 has proved to be a practical lesson of which we propose to give the readers of this volume the benefit.

We hope to show first of all how necessary it is to begin at the right end, by the selection of a suitable homestead with good land, pointing out the class of property to be avoided and the terms upon which a tenancy should exist. We s hall deal with the questions of capital and labour, items which are the foundations of success, and give our ideas upon what stock it is advisable to keep. In these questions we shall go fully into the management, breeding, rearing, purchase, and sale, introducing no theories, unless we expressly state them, but dealing practically with each and deducing our arguments from actual experience. The breeding of poultry and production of eggs will be completely explained, as well as the management of bees and dogs. In most country houses where stock is kept for profit the poultry is often estimated as a nuisance and below its value, whereas it is in all probability the most profitable department of the farm, costing little or nothing, and yielding a large return—a return, indeed, which might be doubled were that attention paid to it which it demands. It is the private individual, compelled to purchase all his corn, who fails with poultry, but with a farmer or person keeping stock and growing a little corn it is, like the pig, a scavenger in the yard, preventing waste and of great assistance to the housekeeper. Again, bees are very profitable, although in a smaller way. On an average holding very many hives can be kept at a very insignificant expense, and the

labour or attention they require is so little that an energetic man would never notice it. It is the results from these smaller matters that so materially swell the annual balance, and unless one is determined to avail himself of all the little advantages the country gives him he had better leave it alone altogether. To enable the stock to be fed we will show what *should* be grown, and how it *can* be grown at a minimum of cost. Works upon farming are as a rule too prone to deal with corn and root growing on a large scale to find time to give details suitable to a few acres ; hence the ideas here explained may prove more useful than any scientific treatise or a thesis on the four-course system. Hay-growing is another most important matter, and it behoves everyone holding even an acre of meadow land to obtain a maximum crop at as small a cost as possible, and to utilise it among his stock in the most economical way. These matters need some little outlay at the commencement in implements and a horse or two ; we therefore endeavour to show what it is necessary to purchase, how to purchase, and finally how to make the most of them when obtained. The horse demands particular attention, and as he is so often the pet and factotum of a household, so, with generous and sound treatment, can he be made to do the little work required of him on the land and be utilised in the family conveyance as well; nay, a useful animal could now and again be saddled, as in a country house a quick journey is often

necessary, and for the use of the master or for the purpose of learning the young members of the family to ride, an accomplishment every young English man or woman should acquire. The carts, four wheels, and harness will also need attention, for these articles are all expensive to purchase; and proper attention and cleaning, with the owner's eye constantly upon them, will make them last for years. Another great source of enjoyment and profit in the country is the garden; to this we have devoted some attention, and although we do not enter into any complex exposition, we show plainly what are the chief vegetables deserving attention and how they can best be cropped. High gardening is most productive, and when the meadows are shut up for hay the cowman is always glad to run to the garden for cabbages and all refuse leaves, and greens there produced. What the cows refuse the pigs will eat; hence a careful man will never allow anything from the garden to be wasted.

Should there be any pond or stream upon the premises it should be utilised as readily as the land; fish can be bred without much trouble, supplying the family with an agreeable meal now and then, and at the same time affording such sport as is often very highly appreciated. The ducks would not harm them, but thrive all the better for the to them most enjoyable bath. Watercress, too, is most readily grown, but where ducks are allowed to swim it would be eaten by them; therefore, as it is a household luxury,

some minor stream or clean ditch should be made available and the cress grown as hereafter described. Perhaps there is nothing so enticing to a visitor at a country house as the dairy; rich cream, sweet milk, and delicious butter are all most enjoyable, and we devote a chapter to the complete study of dairy management and cheese and butter making. This department should be presided over by the mistress or an elder daughter, determined to infuse into it industry and cleanliness, for dairy work is an incessant display of both. There are few men who are not fond of sport, and perhaps fewer still who are not fond of rabbits; we have therefore explained how they may be bred and caught (we refer to wild rabbits), at the same time giving the requisite details for the management of ferrets. These little animals are often of great service in the country, not only when rabbiting but ratting. Rats infest outbuildings almost wherever stock is kept, and, as trapping is often tedious and unsatisfactory, the ferret may be used with great effect; but we deal with them as with the larger vermin the fox—in proper order. There are several other little matters which require consideration, for no square yard of land should be laid to waste. Where there are trees timber can be lopped for the winter fires, and in waste corners smaller trees can be grown. Not only may fruit be produced in the orchard, and largely if it is well managed, but young trees should be planted in

hedgerows and dotted about the meadows. Nothing should be left to chance, and wherever a thoughtful man can see room for improvement he should make it *at once* if it is a really practicable matter. In short, there is no end to the home production of food for home consumption, and, excepting for clothing, grocery, coal, and minor matters, it should not be necessary to have a tradesman's bill at all. We remember reading an old work many years ago which was written early in this century and entitled 'Rural Economy.' It was the author's object to show that a gentleman and his family could reside in the country, with economy and 200*l.* a year, in every respect as well, and keep up as good a social status, as if living in London on 1,000*l.* a year, even allowing a livery servant and carriage. We carefully examined the plan, which was very ably and minutely detailed, and we have no hesitation in saying that in most respects it was perfectly feasible, and we believe is so still. The author assumes that a good house and forty-three acres of nice land could be obtained for 135*l.* per annum, including taxes. He then lays out the land in plots, producing returns for each either in the house or at the market. Bacon was not only to be provided free of cost, but sufficient pork grown to pay the butcher's bill. Indeed, the land was to be made to produce everything but wages, grocery, doctor's bills, clothing, coals, wine and spirits, and personal expenses; and, as the sale of the majority of

the products for cash would defray these expenses, the rent almost alone was to come out of private income. On the other hand, in estimating the cost of the same style of living in London, the author brought the total up to 1,150*l.*, and we are bound to say his figures are neither immoderate nor inconsistent. It must, however, be remembered that in the country the gentleman is presumed to be working his land at a profit and devoting his abilities and means to this end; yet it will be admitted that all this is more pleasurable than wasting time in a large city and simply living an unproductive existence. Not only does the country system cost so much less, but it affords so many comforts that town cannot claim —viz. gardens, fresh fruit, vegetables, game, poultry, and dairy produce—in plenty and perfection, together with sporting and recreation of all kinds, against which are to be set several little inconveniences which are inseparable from a country life, but which on examination will generally be found to be connected with expense.

The truths which we have proved to our benefit in health and purse we hope others will investigate, and although it is not our intention to submit any comparisons between town and country living, as our old author has done, yet we must leave our readers to draw conclusions which will, we believe, remain decisive and altogether most favourable to the prospects of those who embark in the career we here indicate.

CHAPTER II.

SELECTION OF HOMESTEAD.

Leases—Covenants—Taxes—Requirements—Repairs—Agricultural Holdings Act—Timber.

THE most important step in commencing an active life in the country—nay, the basis upon which every ultimate proceeding must be calculated and success attained—is a selection of a suitable residence or homestead and soil. There are many things to be considered, and it being assumed that cows and other live stock are to be kept, a search should be made for a property within easy distance of a large town, not far from a rail—both of which advantages mean a real decrease of rent—and such as has not been exhausted by the previous occupier. A judicious advertisement in the leading London or country papers would prove of great assistance, but few better plans can be recommended than a vigorous call upon London estate agents; for not only will many suitable places be found, but every particular, except such practical details as can only be discovered by a visit to the property, will be to hand, and inspection can more

readily be made. London agents will in all probability offer tempting plots about the sandy parts of Surrey, where firs and furze have hitherto held undisputed sway, but where small farms are becoming the fashion; or they may describe some delightful residences to the north, east, or north-west of London—places which seem to have been made for the enquirer—but until, by persistent efforts, he discovers that the soil is clay and undrained, he will not fully understand how important it is to insist upon knowing everything at first. Sand should be avoided as one would avoid undrained clay. Indeed, the richest of soils ought to be drained; and here we advise that at the outset it should be determined to require certain conditions in any property before examination takes place, much more before an agreement, however provisional, be entered into. A lease, which in most cases is a desirable instrument, even if only seven years, is a very large fraction of a man's existence, and during its term it is probable that his children may be young and their health and character formed for life. How important, then, is it that its terms should be such as he can honourably and gaily assume, instead of binding him down by covenants which are frequently the burden of his existence and the causes of much more despondency and failure than is ever imagined. Few but old tenants properly estimate the value of apparently harmless covenants until the time comes for them to be put in force, and as that time is as

certain to come as rent day, it is much the best to clip them of their dangers at first. Another point too is the necessity of being guarded against accepting the *ipse dixit* of an agent. How frequently have leases been signed, although objected to in some particulars, because the agent has promised that he will see that it is 'all right;' but he may die, or he may forget or decline. Indeed, it must be apparent to any thinking man that if it is necessary for the landlord to have the tenant's signature to the deed, the same rule should hold good with regard to the disputed covenants. The tenant's bond against the agent's word is not fair, and should never be given.

Presuming that the land and homestead are suitable in position and rent, the extra expenses should be enquired into—rates, tithes (if any), and taxes. The parochial and county rates at present vary very much in some counties, and they are sometimes very high, and consequently a great consideration, being a charge upon the tenant. The tithes are also tenants' charges, but the property tax and land tax should be borne by the landlord, although it is usually sought to impose the latter, together with fire insurance, upon the tenant; but both these demands should be resisted. It may, however, happen that the land tax is redeemed, when there will be no demand at all. On visiting the property a thorough examination of the soil should take place, and if heavy and drained it should be ascertained if the drains are mere bush

drains or not, or if they are thorough and complete; otherwise the landlord should be required to make an allowance for their completion, or if not drained at all an arrangement should be come to to have it done at once. Next the gates, hedges, and fences should be overhauled on every part of the estate, and put in proper order by the landlord, or an allowance made for the work to be done. All these items are of great importance, and on no pretence should they be neglected. In most cases wood is to hand, and four-rail fences—not costly, but it should be seen that they are not scamped or a couple of years will find them again dilapidated. It should be a matter of agreement to cut timber on the estate for repairs. The house we need not deal with; most householders understand their duties with regard to it; but we must glance at the buildings. An estimate must be made of the space required for stock; hence certain cow-sheds, calf-cribs, piggeries, stables, cart and implement sheds, barn, granary, henhouses, lofts, &c., will be absolutely necessary. As the tenant will have to keep these in repair, he should not scruple to thoroughly examine them. If the roofs are thatch they will no doubt require thatching in some parts, or they may be very old and almost useless, although exhibiting a respectable appearance to the eye. Slate, tile, or wooden roofs should be similarly investigated, and repaired where necessary. Let it be seen that the beams and joists are not rotten and the floors per-

meated with rat runs. If these buildings are to be painted, tarred, coloured, or whitewashed during the tenancy, it should be done at once by the landlord, unless they are in first-rate order. A careful search should be made over the whole premises, in order to ascertain that there are no old walls, doors, fixtures, or landlord's property of any description which have to be kept in good repair, but which a careless man may overlook and accept, rotten though they be. With regard to fences, if a tenant can come to an arrangement with his landlord to provide wire fencing, so much the better; if not, he should obtain his consent to provide posts during the lease, and as hedges or fences fall in he can put up the wire himself. Though rather expensive to buy new, it can be obtained second-hand for a very small sum, and with a straining machine, which costs about 10*s.*, the whole can be done by himself and men. If he decides to continue the quick hedges he should introduce gooseberry bushes wherever a gap occurs; they will answer quite as well and provide a capital supply of fruit into the bargain. The gooseberry is a useful plant for hedge-*mending*, and in many cases where the whitethorn will not grow cuttings of such an upright variety as the 'Champagne,' planted in November, take root and do very well. It sometimes happens that wooden fences are made throughout, and if well done they are highly ornamental, more especially if of small round timber, but, unless protected in some way

from destruction by the action of the weather, they speedily fail. They are sometimes tarred, but a better way is to adopt the following method :—A convenient cask is two-thirds filled with water, into which is thrown sufficient sulphate of copper to form a saturated solution. Good straight boughs or saplings, with their larger shoots removed, are placed upright in the mixture. In two or three days they become completely impregnated, and are taken out, peeled, trimmed, and laid to dry. The solution will do over and over again until the sulphate is exhausted.

In determining to take a lease of the property fixed upon there are a few points upon which too much stress cannot be laid. First and foremost is the Agricultural Holdings Act, which was passed by the Legislature in order to compensate the retiring tenants of farms for improvements which they had made but had not reaped the benefit of. It is now the custom to insert a clause in a lease by which the tenant binds himself not to make any demand under this Act, but the principle is so just that we cannot understand how English gentlemen can so far forget the position they hold as to thus juggle themselves out of its reach. A case came under our notice in which a tenant had deep-drained, manured, steam-ploughed, and fallowed heavily; his landlord had contracted himself out of the Act, and at the expiration of the tenancy, refused the tenant to relet at a valuation, but putting the land up by

tender, it was relet at a ruinous rent to a neighbour, who knew its splendid condition. No tenant should permit the insertion of this most unfair and un-English clause, nor should he admit the right of his landlord to preserve game on his land. Ground game should be his own special sport and perquisite, and he should enjoy it as such, and preserve it if he please; with it a landlord can have no moral right, and if he acquire a legal right to kill it the tenant is no longer master on his own grounds. This matter is, however, now receiving the attention of Parliament. If there are trees on the property the lessee should not allow the lessor to prevent him from lopping them. The usual clause forbids 'lopping and topping,' but it is obvious that if he may not lop, although in the midst of plenty, he may have to buy wood for his winter fires and stakes and rails for his hurdles, fences, &c., besides which the lower branches of trees are most detrimental to the growth of grass or whatever is beneath them. In the same way he should have a written understanding that when timber is cut it must be during the hard winter, when it will not damage his land; otherwise he may find a gang of men felling his trees just before the grass-growing season, and timber merchants carting it away among his long grass and spoiling it wherever they go. We have seen this happen, and can therefore urge it all the more strongly upon the notice of all intending lessees. Another point is to obtain protection in the lease where it is intended to

plant fruit trees extensively, or shrubs, &c., for sale. On some properties there is much waste land, suitable only for the latter purpose, and it would be absurd to allow it to lay idle. Few landlords would refuse such protection, but without it there are agents who would advise their patrons to prevent the removal of what a confiding tenant had grown. All leases are especially binding in the matter of repairs, but no lessee should allow the admission of the word 'rebuild,' which it is often sought to introduce into the instrument. It is a small word, but it might by chance prove absolutely ruinous. Again, it is generally provided that the house or land shall 'not be underlet;' yet, although we can have no objection to the principle, we would insert the clause 'for more than one year.' It sometimes proves advantageous to underlet a meadow for a season, or may be an opportunity occurs for letting the house for a month or two, enabling the resident family to remove to the seaside or to town for a change. It may probably happen that as a rule a landlord would not object to such a course if asked, but how much better is it if embodied in a deed which gives the lessee a prescriptive right in the matter. In some parts of England running streams have to be cleansed every few years, and as this is a landlord's affair we just utter one word of caution to tenants who might innocently undertake to pay for it. Where the property is entailed it will, as a rule, be found that the covenants are hard to deal

with. Entailed estates are the worst tenants can take, for they have little or nothing spent upon them, and where another landlord will heartily join his tenants in improving his property the landlord of an entailed estate turns a deaf ear. The cost of the lease is usually divided between the parties to it. In England properties such as we are referring to are let for seven or fourteen years. In France and Prussia the tenure of farms is six, nine, and sometimes eighteen years; in Belgium three, six, or nine years, but in that country the holdings are much smaller.

CHAPTER III.

LABOUR.

Wages—Duties of the Men—Beer—Encouragement of Men—Their Gardens, &c. — Implements, Carts, Machines — Stock — Cows, Pigs—Purchasing same—Various Breeds—Selling Beasts—Rules of the Trade—Mr. Lawes on Selling Cattle—The Laws as to Live Stock—Age and Descriptive Terms.

Labour.—It will be found of the highest importance to secure the services of men who are experienced and trustworthy. Although it is a maxim that to have anything well done a man must do it himself, yet it is impossible for an individual placed in the position we are describing to do much more than see things done; indeed, he must necessarily leave many things to his men. A gap left unmended for half an hour may admit the pigs into a valuable garden, where damage may be quickly perpetrated which cannot be repaired in a season. Doors and gates left open admit animals to each other which it is essential should be kept apart. Some little carelessness may admit a herd of beasts into a neighbour's field, when several pounds' expense may be required to compensate him for the damage. A hive of bees left upon the damp ground

all night may cause the death of all. A thoughtless, lazy man will allow his fields to be overrun with moles and his crop damaged rather than trouble to set a few traps daily. The birth of stock pigs, &c., is often delayed indefinitely because of the inattention of the stock man to the animals and his careless watching when they are in season. Indeed, the whole attention of man as well as master is necessary as well to produce stock and crops as to protect and perfect them when obtained. A holding of thirty to forty acres should need two good men and a boy. One man should thoroughly understand stock—their habits and wants—and if a thoroughly reliable man, he would be worth 15*s.* or 16*s.* a week. His time should be from six to six, and it should be strictly kept. He might milk the cows, feed calves, cut chaff, have charge of the cow-houses, piggeries, and stable; and if he is really a man understanding his work, he should be attached to the place, and made to understand that your interest is his, and a present now and then will not be thrown away. He might also have the care of the few implements used, and consequently he should see that they are kept in repair, for in no article does a stitch in time save nine so sensibly. Harness too needs his attention both as to cleanliness and repairs. The stock man, then, should have entire charge of all the animals—of course under the supervision of the master, who should daily give any directions as to the change of food and all necessary

matters. He should have the food delivered to him by his master once a week, and in this matter special attention should be given, as wherever the regulation of food becomes lax, waste and loss immediately commence. Proper bins, with locks, should be provided in a room or compartment set aside for the purpose, and these should be regularly replenished from the granary or store in charge of the master. The best bins are the cheapest, and these are plain iron. As the management of stock will not by any means occupy the whole time of this man, he may be employed upon the general work of the farm—ploughing, sowing, harrowing, hedging, ditching, planting, mowing, assisting in the hay-making and harvest work, hoeing, and the hundred jobs that crop up upon land. The other man should be one possessing a complete knowledge of kitchen-gardening and fruit-growing; and if he combines with this some idea of poultry or rabbit keeping so much the better; but the actual management of these minor animals we relegate to the master himself. This man should be given to understand where his duty lies, as indeed should the other, but it should be a strict rule for either to help the other when it is found necessary by their master. Thus in spring, both could be engaged upon cropping the land, of course allowing the stock man time to attend to his animals, and in hay-time and harvest both should be engaged there. In whichever direction the surplus work lies there devote the strength at command, and

never on any account get behind with it, although some men would rather see this than travel out of what they consider their legitimate work. A thoroughly good man, willing to labour and yet superior in intelligence to the ordinary farm labourer, would also be worth 16*s.* a week, but it should be understood by both that these wages, the same in winter as in summer, would not be augmented during the busy months of July and August, when the ordinary labourer reaps his only harvest. At this time beer is freely allowed to the men in most counties, some masters paying them so much money instead, and allowing them to find their own, others finding the beer, which they purchase at a low rate. This question is one which should be left to the discretion of the master and the reasonable desires of his men, for he will naturally need a few extra hands during these busy months. We have strongly advocated the discontinuance of beer and the adoption of milder beverages, but we have more than once handled the scythe and assisted in a fair day's work among our own hay-makers, and we candidly confess that the nature of the work caused a craving for what we seldom drink at any time, viz. beer. Tea failed to satisfy, or even fortify, the inner man, and we reluctantly came to the conclusion that the men had the best of the argument. There are some fellows who can work upon tea, but that is usually when beer money is paid. Devonshire men prefer rough cider,

a drink as distasteful to those not used to it as it is said to be invigorating by those who drink it. A strong boy will always be useful; he should be handy among horses, used to stock, and, in fact, a lad who has been brought up on a good farm. He can drive at plough, help in the gardens, in the stables, piggeries, cow-houses, &c., feed the poultry, drive the cart to town or village, catch rats and moles, cut wood for the house, cart coals from the station, and whatever else may be necessary. If he lives in the house, as he should do, he would, if a tolerable scholar and not less than sixteen, be worth 5*s.* a week, a sum almost equivalent to a man's wages; but so it is and so it will be found. If the men we have described cannot be found, a visit to an agricultural neighbourhood will not be in vain. They are plentiful in the counties north of London, though scarce in the south. If there is one thing more important than another it is to let one's men understand that an order given is intended to be executed. Workmen are often very procrastinating, and like to tackle a job at their own time; hence an iron will is very necessary. Let it be 'Do' and he doeth it. In requiring a workman to be constantly interesting himself in his employer's service a great deal is certainly demanded, but in many cases it will not be demanded in vain if the man perceives that he is working *with* his master towards one common end—the prosperity of both—and that his master takes a corresponding interest in his comfort

and well-being. Every working man should have a garden, and it should be one of the duties of all who are placed in a superior position in a country village, to encourage the men to cultivate their gardens to the best advantage, to assist them in keeping a pig or two, bees, and indeed whatever may conduce to their happiness. We are well aware, from experience, that there are very many men who do not deserve this encouragement, but they may be reformed in some cases; it is, however, the deserving who should be allotted a piece of land if they have no garden, and who should be instructed if they are ignorant. In the writer's parish the vicar and the largest landowner weekly meet with others to instruct the labourers, and they materially benefit by what they learn. A thrifty man can always derive profit from a pig, and no mean profit either, and if the outlay is at first too much for his pocket, he should get his master to sell him a young gilt and pay for it by instalments out of his wages. This little animal will cost him scarcely anything until it has its first litter, at about thirteen or fourteen months old, and if a good one it will be worth 8*l.* or 10*l.* a year to him if he takes care to grow plenty of vegetables for it. He can cut bracken for its bedding, or grass on the roadside, or, what is better, he can make it a wooden bench to lie on, when it will require no bedding at all. A labourer too may make a good sum by rearing chickens and ducks, and the profit of

this at the end of harvest would buy him a sow full grown. If he works and saves another year, his chickens, added to the profit from a litter of pigs, would purchase him a young cow calf, although this is best bought in about May; and then if he runs it along the roadside, or on a common, a boy tending it, it will grow fast and be ready for breeding at the end of the summer, and the next year produce him a calf, which he should fat on the milk and sell at 5*l.* or so at the end of six weeks, besides providing for the year milk enough to half keep his children. Any labourer with half an acre in the country can acquire this position if he perseveres, does his best for his master, and obtains that master's help and advice.

Implements, &c.—A few words will be necessary with regard to the articles required to cultivate the land, and, considering the limited nature of the holding, our advice on this head will be brief. First of all a strong farm cart will be wanted for carrying heavy loads of manure, earth, gravel, hay, roots, and so on. It must be a good cart, and we would advise no one to allow a wheelwright to patch him up an old one, a job these men very much like. Get the village wheelwright to make a new one, of seasoned wood, with narrow wheels, and with ladder and copses or rails; bargain as to price, and it will be found that for about 8*l.* a really good cart can be made. A light market cart will also be necessary; it should be roomy, with back seat, and made to carry four persons.

Such a cart is convenient for many purposes; it will carry a sack of corn at a push, or a pig to market. This class of vehicle is often sold second-hand at country sales, and may often be purchased for about 7*l.* to 8*l.*, or made new for about 12*l.* One thing is certain, that a good one is the cheapest in the end, whether new or not. Some farmers employ a wheelwright at their farms to make their carts, and this is a cheaper plan. They get the iron-work made at the blacksmith's or purchase it second-hand. We once visited the London Cattle Market, where every variety of the iron-work of vehicles was offered for sale, with wheels of all sizes as well. There a man could purchase a pair of second-hand springs at a nominal price, shafts, steps, and indeed every portion of a cart. Care should always be taken to ascertain that the box, spokes, and fillets of the wheels are sound and perfect, and the tires thick and firm, for it is a common dodge to fill up the cracks and holes, if any, in the wooden parts of the wheels with putty, which, when painted over, cannot be detected. In second-hand carts the springs and axle-trees should be also examined, as they may have been broken and badly mended, and a mended axle-tree is never reliable. The shafts too may have been spliced and the join hidden.

The implements required will in a great measure depend upon the soil, and before purchasing it will be found a good plan to call in some neighbouring farmer of reputation and take a leaf from his book.

A plough will be necessary, and in most cases the best maker in the neighbourhood would supply the exact thing wanted at a very reasonable price. Howards are very good, also Ransomes. If the arable is at all heavy and dirty (i.e. full of rubbish) a drag harrow will be necessary, as well as a small harrow for lighter work. On some grass lands a chain harrow is necessary, but the custom of the neighbourhood will be a guide in this case again. With regard to the purchase of a roller, it may be remarked that this is an implement of greater cost, and as it is so little used it may be found convenient to hire one for a few days from some neighbour when required. Smaller machines, such as a cake-crusher and turnip-slicer, will be very necessary, and above all a chaff-cutter. As to the latter it may be considered whether a machine needing horse-power had not better be purchased, and the chaff cut once a week for the whole stock. We are great advocates of chaffing everything; it is strict economy, and if several head of stock are kept it would be out of the question to cut the chaff by hand. Straw, pea and bean haulm, all should go through the machine. The three last-mentioned machines may usually be purchased at sales. A very useful machine, and one which is very much more necessary than farmers allow, is a weighing machine; this should be upon every homestead, as well as bushel and other measures. If the grass land for cutting exceeds twenty acres, it may be a

question whether a mowing machine had not better be added to the list. These are becoming cheaper every year, and the amount they save in labour, irrespective of the rapidity with which they do their work—often a matter of high importance in wet seasons—should be an argument greatly in their favour. Besides, it may happen that some neighbours may need a little help, in which case something may be earned by the machine. Similar considerations must weigh with the occupier as to the purchase of horse rake and hay-making machines; both are useful, saving much in labour, and enabling a farmer to get up his crops with ease. Drills we do not think are necessary on a small holding. A horse hoe may be requisite if the arable is of any extent; but this, again, must be considered, for it can be dispensed with. A mill for grinding corn will be of great service; the best maker is Lloyd, of Barbican. These mills can be set so as to grind barley, oats, or wheat into meal. They will dress fine enough for household purposes, and are of incalculable value among live stock. A very good one can be obtained for about 6*l.* 10*s.* Among smaller articles required are hay forks, rakes, and two or three drag rakes. These are all best purchased at sales about Michaelmas, when they can be certainly purchased for half-price. A good grindstone is not only useful but necessary; three ladders too are indispensable, two or three cattle troughs, and several pig troughs, all of which should be of iron. A liquid

manure cart on such a place must be had, and it should be of a size to fit a cob. A good rick cloth, and poles and pulleys, and a cart cloth or two will effect a great saving some time or other; and lastly sets of harness for plough or cart work, with chains and whipple-trees, must be purchased. We think every article of importance has been mentioned, but there will constantly be found little things which are needed, and a shrewd man will always be on the look-out for such at neighbouring sales, which he should make a practice of attending. We know many farmers who are good all-round judges of stock and implements, and who attend all sales within a reasonable distance, picking up many bargains and always ready to buy anything at a price. A deal of money is made by them of stock which is sold in poor condition and consequently for little money, as by the aid of judicious feeding they are able to effect rapid improvement and sell at a good profit.

Stock.—A matter of even more importance than the purchase of implements is the selection and purchase of stock. First, it will be a good plan to decide upon the breed, and next upon the number to be kept. Whatever variety it may be, or even if cross-bred, do not be persuaded into purchasing an old cow. Whatever is bought let it be a heifer with her first, or about to calve with her second, calf. If purchased in calf, unless you are satisfied, let her be warranted or forego the bargain. An experienced

man can usually tell if a cow is in calf from the fifth month ; the fœtus can be felt on the right side in the hollow under the loins, and later on it will respond when pressed by the fist. Notice should also be taken that a cow is in health and chews her cud, that she has no deformities, is sound in her wind and perfect in each teat, many having lost one or two quarters, and consequently giving so much less milk. These are worth 50 per cent. less and never sell well.

With regard to pig stock, no more should be purchased than the styes will properly accommodate, and it is a good plan to wait if possible, in order to purchase three or four young sows from some reliable person. Our own idea is that cross-bred animals sell the best in the market, and for this purpose the sows should be large and strong and the boar a pedigree animal of the Suffolk or York breed. Great care must be exercised in the purchase of pigs, as disease is at all times serious and to be avoided, and if a boar is kept the same rule should hold good with sows visiting him. Aged sows should not be purchased ; nor is it well to buy them fat, as they are none the better for breeding and cost much more. Pigs going to market should be sent in a cart ; if driven they lose weight considerably. When sent by train a single animal, or even two, may be sent in a crate ; young weaners may go in large pig hampers or crates made for the purpose, but any number over a dozen had better be sent in a truck. On some lines from twelve to

twenty-five may be sent for the same cost irrespective of size. Pigs are very difficult animals to handle, and when sent in a cart a stout net will always be required to prevent them from escaping. A gilt or yelt is a young sow until her second farrow, when she becomes a sow; an entire male pig is termed a boar or brawn, and a cut pig is commonly known as a hog.

Purchasing Cattle.—In purchasing beasts a buyer should be guided by quality and age. To ascertain the quality there is much to be derived from the 'touch,' which gives the most perfect idea of the mellowness of the flesh; the fingers should be passed over the ribs, rump, and flank; and if the animal is desired to be fat these and all other parts should be soft, yet plump and well filled. The face will wear a contented aspect when the animal is quiet, the eye mild, and the whole carcass will look sleek and handsome. The hips should be wide, shoulder and tail straight, and brisket square. *Shorthorns* are the best for fattening; these are known by their small heads and horns, lengthy and deep bodies, fine bone, and short legs. The colours too are characteristic, being red, white, and roan, roan and white, and red and white. *Herefords* have long white horns, which are spread; they are red in colour, with a white blaze up the breast and face; they fatten well and mature early, but are not good milkers, and the cows are much smaller than the beasts. The *Sussex* are somewhat larger and taller than the above, an entire dark red in colour, and long

in horn. They are coarser animals, very square, do not fat early, milk fairly, and work well. *Longhorns* are very large and much longer in horn than any other variety. *Devons* too, though smaller animals, are fine beasts for fatting; they are very hardy but do not milk well, have rather long creamy horns, and are bright red with orange noses. *Dutch* are not so useful for the butcher, but milk well; they are black, or black and white. *Polled* oxen have no horns, and are very large and coarse in coat, but they fat very quickly. *Jerseys* or *Alderneys* are not good fatters; in colour they are either silver grey, fawn, mulberry, or sooty fawn, with black tongue, muzzle, and tail end. *Guernseys* are light fawn and white. Both have small heads and fine horns. *Kerrys* are very small and black, and similar in size to *Britannys*, which differ in colour and horn. *Ayrshires* are small, with small heads and horns; they are red brown or brown and white, have good hind quarters, and milk famously. In fatting beasts for sale it should be a rule to bring them in for the butcher at Christmas, when they are usually in the primest condition and realise the best prices. An idea of their value may be obtained by careful examination and measurement, unless the owner has a trained eye. It must be remembered that the carcass only is valued by buyers—in fact, the two sides of the beast as it hangs dressed in the slaughter house—the 'offal' being the butcher's perquisite. This offal, which a selfish trade custom robs the

producer of, consists of the hide, worth from 15*s.* to 35*s.*, the tongue, head, tail, kidney, skirt, heart, liver, tripe, legs, blood, and from 70 to 80 lbs. of fat. These parts of the offal are in reality all valuable portions of the beast, but custom makes no allowance for them ; therefore, in estimating the weight of an animal, it must be borne in mind that the actual carcass bears only a proportion of about 60 per cent. to the live weight according to *age*. Thus a shorthorn steer is nearer 70 per cent., and younger ones not quite so much. The plan devised by Youatt is as follows :— Measure the length, and girth behind the shoulder, from the tail to the fore part of the shoulder blade ; multiply these to obtain the square superficial feet. Next multiply by 23 lbs. to each foot super, and you obtain the weight in lbs. This plan is varied a little according to the size of animals. Calves may be weighed bodily, and 8 lbs., allowed in each score for offal. In England the stone is mostly 8 lbs., though in the north 14 lbs. are allowed, and in Scotland 16 lbs. When beasts are purchased at a distance it is well to send them home by rail, the cost of transmission being so much less than the loss would be if they were driven, reaching home in an exhausted state, put up on new rations, and perhaps losing health as well as condition. Clean trucks are at hand at almost all stations, and at the large ones animals can be driven in at half an hour's notice. Cows are usually sent in horse boxes, but if quick despatch can be relied

upon they may be quite as safely sent in trucks, at so much less expense.

Mr. Lawes on Selling Oxen.—This gentleman, the foremost agriculturist of his time, lately gave an instance of the value of selling oxen by weight. He was offered 24*l.* per head for some Herefords, and convinced of their greater value, he decided to try an experiment, and offered the whole to neighbouring butchers at 5*s.* 9*d.* per stone, on condition that they were killed and weighed upon his premises. Twelve of the animals averaged 90 stone apiece in the carcass, or just 60 per cent. of their live weight ; consequently a gain of nearly 2*l.* per head was made by this method. The offal was weighed, and averaged nearly 500 lbs. per beast, at an estimated value of 3*l.* 10*s.* It is, therefore, evident that a shrewd buyer places an inexperienced seller at a great disadvantage.

The Law as to Live Stock.—As the object of the Privy Council has been to isolate disease as it breaks out, and stamp it out, the law declares that every owner shall give notice to a constable immediately any infectious disease appears. It is at the same time his duty and his interest to do this, and should it become necessary to slaughter the animals he will then become entitled to compensation, which the local authorities are bound to pay—viz. three-quarter value for any diseased animal, and full value for any healthy animal it may be deemed expedient to slaughter. When notice has been given the authori-

ties take the case in hand, and if the disease is an infectious one they declare the place 'infected,' most severe restrictions being applied to it and movement in or out of it practically forbidden.

Young beasts get two permanent teeth in the centre at two years, or a trifle before, two more at three years, a third pair at four, and a fourth at five years, when they have their complement. The permanent teeth are readily told from the first teeth by their greater size, coarser grain, and stained condition. The horns are also guides to age; they are generally wrinkled at the base, and encircled by rings which correspond with the age if two are added to them. A female calf is called a heifer calf; when it shifts for itself it is termed a heifer, and so it remains until its second calf, or about four years. A male calf is called a bull calf, afterwards a steer calf, a steer, and at three to four, an ox or a bullock. If it is not castrated the term yearling bull succeeds that of bull calf.

CHAPTER IV.

THE HORSE AND HIS MANAGEMENT.

Sort of Animal required—How to Select—His Teeth—Management—The Stable—Feeding—Fodder—Cost of Keep—Condiment—Grooming—Clipping Farm Horses—Shoeing—Vice—Diseases—Harness—Breakages.

IT must not be supposed that this chapter is intended to give a history of the horse and instructions for breeding and breaking him. We shall consider the sort of animal necessary for the work of our farm, and endeavour to show how to procure and manage him, We must suppose that he will be necessary for station work, especially as nowadays all holdings of such a character as that we are discussing are situated some little distance from a railway. Station work may mean a great deal or only a moderate amount of work, as in any event it entails a large amount of regular duty. Next comes the heavy work on the land—ploughing, harrowing, hoeing, manure carting, hay-making, and so on. In addition to all this an animal is always required for family use, and he should therefore be as smart as he can be, and able to travel

safely, and at all events tolerably fast. It may be said that we are expecting too much from one horse, but we think we can show that one good one, well fed, well groomed, and kindly used, can get through a large amount of work with ease, and always look better and fresher than a pair put to the same work which are pretty much left to take care of themselves. We do not pretend to say that any horse can be found which will be at the same time draught horse, farm horse, and hack, but we do believe that if its owner is not too particular as to his showy appearance, he can keep an animal which will very creditably do all he asks it in these respects. The best plan is either to attend a good fair, obtaining the assistance of a good judge, or visit the New Forest. At either place a thick, good-tempered, quick, hardy cob can be obtained for 25*l.* to 30*l.* It is best to purchase a gelding, unless two are kept; and even then we are not sure that it is advisable to keep a mare for breeding purposes, for we have seldom known persons who did so, who did not promise never to do it again. It is a good plan to buy either a Welsh or New Forest cob at the age of four, if he is wanted for immediate work; or, if not, buy him at three, unbroken, as these breeds are readily taught all they need to know without the necessity of calling in a professional breaker. In selecting an animal, first of all test his age, and to this end the teeth are the best guide. The newly born colt has his first and second molars and grinders. In a week his

two front incisors, top and bottom, push through, and at the end of six weeks the two next incisors appear; in three months another grinder, and at eight months a third nipper. At the expiration of one year a fourth, and at two years a fifth, grinder appears. These temporary teeth next give way to the permanent ones, for at three years the central pair of incisors, top and bottom, are replaced by a new pair, much larger in size. At three and a half years the next incisors will be succeeded in the same way, and at four the central pair will be perfectly grown, the next ones nearly so, and at four and a half years the corner ones will fall, the new teeth being nearly up at five years, when the central teeth will be tolerably clean and the next pair stained. Between four and five too the tushes will have begun to show—there are two in each jaw, and they appear near the incisors—being fully grown at six years, when the incisors will begin to look worn and the side ones stained. At seven years the tushes begin to wear, and the second pairs of incisors are cleaner, the third being still stained, whereas at eight years all the incisors will have obliterated the stain, or mark, as it is termed. Having satisfied himself of the age of an animal, the purchaser should see him put through his paces. He should lift his legs up well, the *feet* coming high enough off the ground to escape stones. The knee should bend freely and the feet be thrown *straight* out.

By all means avoid a shuffling cob, one which

looks as though he would go down every minute. See that he puts his feet flat on the ground after every stride, and in walking holds his head erect. The hind legs should be springy—well bent, free, and sharply picked up. All appearance of mincing or dragging is bad, and an animal possessed of either of these faults is certain to display some disadvantage at some time or other. Animals of good character may be bought out of a drove on the forest in Wales, or of private individuals by judicious advertising. At any rate, having satisfied himself as to age and general appearance, a buyer should decidedly call in a respectable veterinary surgeon before closing, in order to satisfy himself as to the soundness of his intended purchase. When the bargain is concluded it will be well to gain any additional information from the seller that he can be induced to give, and in working the animal great caution and kindness should be exercised, particularly at first. It is never advisable to put a new horse in harness and drive off on a journey at once; try him well and carefully until you have confidence in him, and he will quickly develope confidence in you and do all you ask him. Don't drive him fast down-hill; he may have been used to the flat. Indeed, our advice is never to drive any animal fast down-hill; it shakes the fore legs and hurts the feet considerably, more especially if badly shod. Don't fasten on him a tight bearing-rein; drive him with an even hand, neither too

tight nor loose; teach him to keep his head up; and if all is done firmly and gently you will soon be fast friends. A badly made animal should always be rejected—one that has narrow loins, flat sides, or a coarse, flat, heavy hoof. Having trained the cob to do his duty in the cart, he may be tried in a dung cart with a heavier load; this test is often objectionable, but a little patience and practice will overcome it. The best way to teach a horse to draw a plough or harrow is to place him side by side with an old and experienced animal, and a little forbearance is certain to be rewarded. The habits and temper of the trainer have much to do with the future tractability of the horse. A coarse, brutal fellow, who continually bullies and thrashes the poor animal instead of assisting and encouraging it, has much to answer for; it is he who cultivates vice in a naturally docile creature, and teaches it to resist his authority, to jib, kick, and so on. We are satisfied from personal experience that, so sagacious is the horse, he will do all he is called upon to perform if he is well treated, and completely obey his master. When driving, the word only, and not the whip, will be needed to make him go faster, and indeed the same when riding. When turned out to grass, a carrot or a handful of oats will bring him when he is wanted, and oftentimes the voice alone We advise, then, the occupier of our farm to identify himself with his horse as with his right-hand man.

In the stable we are entirely averse to old-fashioned racks and mangers. The former should be done away with altogether, and the latter should be altered; instead of being smaller at the bottom it should be wider, when the practice of pushing out so much chaff will be frustrated. It is our plan to chaff all hay and straw instead of giving it whole in the rack. The labour it entails on the men is the only objection to the system, and if they can shuffle out of it they will. Chaff is better for the horses and not one-half so wasteful. New-fashioned mangers have partitions for mashes and water; in the absence of these the pail must be used. A loose box is always preferable to a stall, if it can be managed, as it gives the animal more freedom; the floor of the stall should always be so laid down that the urine runs away into a pit constructed to retain it for purposes of manure. The bed should always be laid for the night and forked up under the manger in the morning, the manure being first removed. With regard to feeding, a cob will not require more than 70 lbs. of hay, 30 lbs. of straw, and one bushel to one bushel and a half of oats per week, according to his size; but he should be regularly fed and groomed, and water—not too much—given when he requires it. When he is working hard he may have extra corn, even going as high as two bushels for a thirteen-hand cob, but with ordinary light work he will need no more than one. At this rate his keep would in a year amount to—

	£	s.	d.
For hay, say 65 trusses, at 2*s.* 3*d.*	7	6	3
Straw	2	0	0
Oats, say 65 bushels	10	10	0
Shoeing	1	0	0
	20	16	3

At some times during the year he will need a few feeds of beans, and at others mashes; a little condimental food may also be found beneficial now and then. On the other hand, he will be turned out perhaps from the middle of May until September, unless he is stall fed with artificial grasses; and during the months of March and April in some seasons these grasses, comfrey, and roots will be given him, all tending to very materially reduce the allowance of hay and even of corn. Taking, therefore, all things together, the actual cost of keeping a cob should not be more than 15*l.* a year, and as most of the food should be home produce, a tolerable discount may be allowed off that amount. Straw for litter should not cost anything; it is returned in value in the manure, and in actual proof of this most farmers will gladly supply it for the manure made. If fern or bracken can be obtained nothing makes better litter, but it is only in a few counties that it grows largely. Furze, again, may be largely substituted for hay, if it can be obtained, but it needs bruising or running through the new machine termed the masticator. Sometimes a horse, more especially one which is not turned out to grass, requires a little stimulant; this may be provided

in the form of a condiment or relish given with his food. Half an ounce of the following, mixed with his chaff, will have a good effect. We saw it recommended by a writer, and very much appreciate it:—Ginger, clove, and aniseed 1 lb. each, mixed spices and gentian ¼ lb. each, ground fine and kept in a canister in a dry place. The cost is trifling. Grooms are very fond of giving horses under their charge spirits of nitre to improve their coat; it certainly does this, but it is a bad practice to administer drugs to any healthy animal, and a horse we regard as too valuable to be physicked by any but a qualified man. Linseed is especially valuable for improving condition; the meal should be given with a warm mash, half a pint at a time. A horse, however, cannot be kept in perfect health if he is not well groomed or if his stable is foul or draughty. Grooming is a business not learnt by everybody, because everybody will insist upon doing certain mechanical parts of it and omitting everything which is the result of thought for the animal's comfort. When the legs are washed they should be rubbed dry, and not on any account left as they were; the horse should never stand on warm litter; his hoofs should not be tarred or greased, but at all times cleansed with cold water alone; he should not be swathed in hot clothing at any time, and unless clipped, a loin cloth is all that is necessary in winter. Clipping may be advantageous as far as regards the legs and belly, but we would go no higher; for a farm

horse, when standing about in wintry weather, needs his coat for protection. When he returns from work with a wet coat, whether from perspiration or rain, he should be groomed until he is dry, and on occasions when he is very wet after a hard day's work he should have a mash of bran, or boiled roots and bran, for his supper—a meal which will be highly beneficial if given regularly once a week throughout the winter, more especially in its operation on the bowels. Feeding should never take place immediately before hard work, although gentle exercise will not cause any discomfiture. In the same way drinking before a journey is hurtful; indeed, if a pail of water is always beside the manger no fear need be entertained as to excessive drinking. Drinking when very hot and fatigued is bad, and the animal should be allowed to rest and cool before water is given him. The safest and best grain for horses is the oat. Wheat and barley are not good, peas are bad, and beans, the most powerful of horse foods, are not advisable unless the animal is undergoing tolerably hard work. Meal is not good, because so much of it is swallowed whole and escapes digestion. In all stables the nose bag should be used, and whenever the horse is on a long journey, or working three to four hours without food, it should be given to him. Nothing is more beneficial; it makes him cheerful and at the same time stimulates his frame. The carter who, when at work, puts on the nose bag before commencing his own meal is a kind

man, but it is not always such thoughtfulness is found. When a sick horse needs gruel it should be made of linseed meal and oatmeal and boiled well. The following very sensible remarks upon farm horses we read in the 'Farmer's Gazette:'—

'*Farm Horses.*—A full allowance of oats for a farm horse is 14 lbs. per day; but Indian corn may be substituted for the oats, and given in similar quantity. It should be crushed. The corn is divided into three feeds—in the morning, noon, and evening. The morning feed ought to be given at least an hour before the horse goes to work. After the oats are eaten a little hay or oat straw should be placed before them, the horses cleaned, the stable cleared of manure, and the litter taken out. These operations should not be done whilst the horses are eating; for they are easily fretted whilst eating corn, and when this is the case will bolt their oats. It is a very lazy and dirty practice leaving the litter in the stable all day, or piling it up in front of the horses. Stables cannot be kept sweet unless the litter is removed every morning out of the stables altogether.

'During winter farm horses ought to have a warm mash at least three times a week. This consists of boiled turnips and chaff, and boiled barley or oats, and is given on their return from work in the evening. Horses are very fond of this kind of food. Swedish turnips are also given raw to horses; when this is done the roots must be sliced, and horses will eat

them readily, but we prefer giving them cooked food. Raw carrots are an admirable variety of food for horses; 14 lbs.' weight may be given to each horse per day, and 5 lbs. of oats taken off each allowance for this quantity of carrots. We have found that boiled linseed meal poured on bruised oats or beans, with cut hay, keeps horses in admirable condition for their work. Beans may be substituted with advantage for part of the oats, say one-third of beans, and both beans and oats will be better masticated. A farm horse will consume from one stone and a half to two stones of good hay per day; but much hay is wasted when given in the usual way. Hay ought always to be chaffed; it is a saving of at least one-third of the hay, and the horses fill themselves sooner with it than when fed on long hay. Sound oat straw, pea and bean haulm, are all relished by horses.

'Horses also thrive well on bruised furze, and when fed on it they do not require hay; or at least hay may be given, but in much less quantity than would be required when furze is not used.'

With regard to clipping, which is so general, now that machines are purchased so reasonably, something may be said. We have suggested that farm horses should be partially clipped, because we know that the animal becomes more active and does more work, and every horse-keeper or groom should learn how to handle the machine. It should be run up both sides of the mane, and well over the legs and belly, about

Christmas time, and again in a couple of months, but on no account should the horse be allowed to stand out in the cold or in a draught. If he is clipped all over—and for our part we would not object to that if we were satisfied that the carter would keep his cloth on his loins when standing still—he will look all the better and work more freely. His tail may be cut with a sharp table-knife better than anything else.

We remember reading the remark of a great authority that a horse's natural life was from thirty to forty years, but that the great majority died before reaching twelve, because of their bad management and bad shoeing. We quite agree that grooming and shoeing are flagrant causes of disease, but we may fearlessly add that the infrequent use of the break has a great deal to do with the wear and tear of horse flesh. The foot of the horse should be understood by every owner, as it frequently happens that the smith knows little of it, and consequently shoes it the same at all times. We believe that the best plan is to shoe with the smallest amount of iron consistent with the work the horse undergoes; no calks should be used, and the frog should not be cut down small, but left tolerably large and on a level with the quarters or sides.

A vicious horse, especially if he is old and confirmed, should never be kept. He is at all times uncertain and consequently dangerous. The writer once purchased a beautiful-looking animal, and to all intents as perfect as he looked. A fee to the groom failed

to elicit any information as to bad character, but he quickly showed his colours and ran away with a four-wheel. He was soon afterwards taken upon a common, having been harnessed into an old cart, with a twisted bit in his mouth, and given his head. He ran away to his heart's content, and finding that he gained nothing by the transaction, he gave it up thoroughly beaten. We thought we had conquered, but about a year afterwards, through the laxity of a new groom, the old habit returned, and as the form was more dangerous, he was sold. A jibbing horse is another species which causes much trouble and annoyance; the best plan to adopt is to hook a couple of quiet old fellows on to him and pull him backwards for a bit.

Of the common ailments or diseases of horses some few may be mentioned. *Lampas* is an inflammation of the palate or roof of the mouth. Grooms are fond of treating this with their pocket knife. Lancing is usually efficacious, but we prefer the administration of a little opening medicine. If a horse eats yew, as he often does, the stomach pump should be used, after which vinegar and water should be given. *Cold* should be treated timely, or it may result in something more serious. Damp and draught should be prevented, and a few warm mashes given with a little medicine. *Bronchitis* should be at once treated by a skilled practitioner, and inflammation of the lungs must be grappled with in an equally decisive manner. *Glanders* is a disease to be dreaded; it may be either

the result of foul atmosphere or contagion, and the horse should be immediately isolated and a veterinary called in. *Spavin* is a lameness caused by an enlargement of the joint of the hock. It needs scientific treatment, but that is not at all times attended with success. *Strangles*, a complaint of which a great deal is made by ignorant persons, is a swelling under the lower jaw of young horses, which terminates in an ulcer. It attains a large size, and should be encouraged by hot fomentations and blistering. When it breaks the patient usually recovers. *Surfeit* is believed to be caused by indigestion or stomach disorder; the skin throws out a number of pimples or blotches, which are rarely removed by medicine. An alterative may, however, prove beneficial. *Grease*, or cracked heel, is generally caused by neglect. The heel should be poulticed with bran or vegetable poultices, and an aperient given him. *Splints* are enlargements or bony deposits on the inside of the leg, which are usually caused by blows. With gentle treatment they often disappear altogether or yield to the blister of the veterinary. In all cases of *sprains*, rest is the first remedy, with a plentiful use of hot fomentation, and in severe cases, such as sprains of the fetlock or pastern, blistering is the best treatment. *Founder* is common in the feet of a horse, and may be suspected if he resists any handling of his feet, especially if they are unusually hot. Bleeding at the toe is usually resorted to, together with cooling medicine

and diet and cold poultices. In cases of over-reach, fomentation is useful, with the use of the groom's usual remedy, Friar's balsam. We have not thought it necessary to enter more fully into the nature of horse diseases; a person who keeps one, or at most two, can always treat such cases as those here referred to, and generally with as much success as a qualified man; but where a serious case occurs it is much the best to seek advice at once. A complete and comprehensive treatise on diseases of the horse, by the Author's friend Mr. Hugh Dalziel, should be studied by all who desire to dip into the actual scientific treatment of their horses.

The man attending the horses should be provided with everything necessary to the cleanliness of his charges, and the harness and carts. Good brushes last much longer than common cheap ones, and a plentiful allowance of harness oil and composition is not thrown away in the hands of a careful man. Nothing lasts so long as good harness properly kept, and on the other hand, however good it may be, it will soon spoil and rot in bad hands. There should be a stove to dry it when it is wet, and it should never be put away in that condition; the bits, like the leather, suffering, if they are not attended to immediately they have been used. The condition of harness is at all times a test of a man's value, not only as to its cleanliness, but its wear and tear. Immediately it needs mending it should be done, as the old adage applies

with great truth, 'a stitch in time saves nine,' in harness as in everything else. Harness should be always kept dry and pliant, and in cleaning, it should invariably be taken to pieces. Many accidents have happened through the carelessness of men sending out a horse in broken, rotten, or imperfect harness, and we shall ever remember a severe accident to ourselves which occurred through the criminal negligence of a groom who, having broken the strap fastening the top of the hames on to the collar, tied them with blackened string so artfully as to escape detection. A sudden jerk broke the string during the journey, and the brass hames falling down, frightened the horse almost out of his senses. An eye should always be kept on the reins, and the bridle, traces, breeching, and backband, as in case either of these give way on a journey, with a spirited horse the consequence may be most serious or even fatal. Harness should always be purchased of a respectable maker, and on no account should a person who is not a judge purchase a flashy-looking set at a made-up sale or of a Cheap Jack, or he will live to repent it. Capital sets are often purchased at good country farm sales, which are as good as new, and indeed no second-hand goods are so useful as sterling second-hand harness. As it often happens that in the country it is impossible to have an article mended on short notice, we recommend masters to be prepared for emergencies. In the Far West, where such things are always done at home, a groom carries

an awl, some copper wire and stout twine, in order to overcome the little difficulty occasioned by a break; and here most handy horse-keepers are able, at a push, to tide over the journey or the day with the aid of a knife and a piece of string. A handy man will also be able to do many jobs to a cart; he should be provided with a jack for lifting the wheels, and spanners for taking them off, unscrewing bolts, &c. No conveyance can be properly cleaned or greased without these appliances and a little trouble, and they are all the better for it, lasting much longer, running easier, and looking better. An eye should be given to springs, axles, boxes, &c. for cracks, flaws, and loose screws, and if anything needs attending to beyond the capacity of home labour, at once send it to the wheelwright's before it gets worse.

CHAPTER V.

COWS AND CALVES.

What to select—Qualities of breeds—Gestation—Breeding—Parturition fever—The calf—Weaning—Feeding—Diarrhœa—Feeding cows—Various systems—Condiments—Litter—Poisonous foods—Milking—The udder—Vice—Horns—Diseases—The bull—Ringing—Escutcheon—Shape of a cow—The cow-house—Profit.

THE first thing to consider with reference to this branch of the stock is the number required, and the second, the variety. We once read a little work showing how a cow could be kept upon half an acre of ground, but however true this might have been in the writer's case, it is certain, where any number are kept, 1½ to 2 acres per head is about the mark. If the supply of roots, artificial grasses, and straw is liberal, even one acre per cow might suffice, but in most seasons this would hardly satisfy them. The tenant must therefore make his own estimate, allowing fully for the quality of the pasture, its yield, the arable crops he grows, and the variety of cow he intends to keep. In deciding upon the breed he must determine whether he intends to make butter, to sell his milk, or to make calf-rearing his principal object; butter and milk for other

purposes being merely supplementary. The chief breeds from which he should select are Shorthorns—Ayrshires, Dutch, Channel Islands breeds (Jersey and Guernsey) and Swiss. Of the first-named there are Shorthorns and shorthorns. Highly-bred pedigree animals are not to be classed as milkers; they have been selected for other properties. But the ordinary farmer's shorthorn, which is in reality in most cases a cross between an ordinary cow of the district bred to the pail, and a pedigree bull, is a worthy animal, milking well, throwing calves which grow rapidly and sell well, and fattening for the butcher when her dairy days are over. It has been said that it is incompatible for a cow to possess two properties, for beef and milk production, but with this theory we do not agree, having known so many animals which have proved the reverse. That the secretion of milk and of fat at the same time is incompatible with nature we admit, but in the Shorthorn these qualities succeed each other, hence when a cow no longer secretes milk, she will secrete fat unless she is half starved. If then the rearing of calves is decided upon, we at once say, select good milking Shorthorns; let them be young, an old cow will never pay; if heifers, all the better, for with them there is the least deception, and they can be tutored into the ways of the farm more readily. It is also well worth considering whether in the event of the milk being sold, Shorthorns should not be selected, for many are very large milkers and the

calves pay better than any others, but it must be remembered that in purchasing, the prime cost is considerably more, as indeed is the result in selling. Ayrshires are smaller animals, tolerably hardy, very good milkers for their size, not so good-looking as the Shorthorn, nor so apt to put on flesh, although in this respect they are not absolutely bad. They are very profitable dairy animals, costing very much less than the Shorthorn, and not dainty feeders, but their calves do not sell so well by any means, nor pay so well for keeping. Dutch cows are larger animals and larger milkers; they are black or black and white, and ordinary-looking in appearance. As feeders they are something akin to the Ayrshire, not fattening very well; they vary a great deal even as milkers, but if a good herd can be obtained by judicious purchasing, they would prove extremely valuable. They are highly appreciated in America, and were very much admired for their milk production at the Paris Exhibition, while at the English Dairy Show a Dutch cow secured the milking prize, giving no less than 64 lbs. of milk on the day of trial. This breed is much patronised by London cowkeepers, on account of its large yield of milk. The Jersey (Alderney) has been so much bred for fancy points that its reputation as a large milker has become subservient to its quality. Certain it is that this variety is only an ordinary milk-producing animal, although it must be admitted that the milk is the richest of any

breed we know. It is moreover a somewhat delicate cow, unfit for cold or damp lands, requiring more care and attention than can usually be bestowed upon a beast, and withal a very bad variety on which to lay flesh. The calves do not sell well in the market, although heifers can usually be sold pretty well to private buyers, and a barren Jersey cow is a very bad article to have on hand—indeed pure bred Jerseys should be shunned altogether. Guernseys, which are larger than the preceding, differ in little else but colour, the Jersey being a sooty fawn, with black points, silver fawn or silvery grey; the Guernsey fawn and white. They produce about the same quantity of milk, if size is allowed for, of somewhat equal quality.

The Swiss cow is an animal little known in England, but our own testimony and that of others who have tried them amply confirms the reputation they enjoy. In colour they resemble the Jersey, varying from the dark sooty fawn to the light silver grey, but there, excepting in the dark tail and black tongue, all resemblance ceases. They are much larger, thicker, and deeper in build, the tail being set on high, and the head, though large, strikingly unique and handsome. The coat is coarse and long, the udder large, and in constitution they are the hardiest animals we know, living where some animals would starve. They are very large milkers indeed, although the quality of the milk is not so good as in the Jersey, and among

the most docile and contented of the bovine tribe. The calves are remarkably precocious, and are quickly fit for the butcher. One of the chief qualifications of the breed is its readiness to put on flesh, and although it does not equal the Shorthorn in this respect, it is far better than any other milking breed. The best Swiss cows come from the Canton of Zug, and these are indeed grand animals. In this we are supported by no less eminent an authority than Lord Chesham. Our examination of the breeds gives us the following result. If calves are to be reared, Shorthorns stand first; if milk is to be saved, Ayrshires, Swiss, Dutch, or Shorthorns; if butter-making is the chief aim, we would prefer strong hardy Jerseys if we could get them, or either of the above crossed with the Jersey. In proof of the value of Jerseys as butter-makers we quote the following experiment—one of many, and taken from the 'Agricultural Gazette'—of four cows. No. 1, a Jersey, made 1 lb. of butter from $5\frac{3}{4}$ quarts of milk; No. 2, Jersey, made 1 lb. from $6\frac{1}{4}$ quarts; No. 3, half-bred Jersey, made 1 lb. from $8\frac{3}{4}$ quarts; No. 4, three-quarter-bred Ayrshire, made 1 lb. from 13 quarts. The weighing was accurate, and the calculations were upon the basis of 2 lbs. $1\frac{1}{2}$ oz. to the quart.

In buying the animals, unless the purchaser is an astute judge, he should avoid a public market where all sorts of screws and barren cows are sent for sale. The best plan of purchasing Shorthorns is to attend sales at farms where high-class animals can generally

be picked up, although the prices run high. Such animals are more reliable, and full information can be obtained as to age, milking properties, and time of calving. Unless every care is exercised, an inexperienced man is some time certain to be cheated, therefore it cannot too earnestly be impressed upon him not to buy qualities which he does not see before him, or which are not guaranteed in black and white by a respectable man. The teats of a cow should always be examined, as if the milk refuses to come from one, what is termed 'losing a quarter,' she is worth 25 per cent. less money. Her age can be best told by her face and horns, young cows looking bright, happy, and gay, old ones dejected, worn, and—well, old. The horns are smooth, clean, and fresh in a young cow; longer, wrinkled, and covered with corrugated rings in an old one. The most frequent method of cheating, however, is in palming off barren cows as in calf; and as the truth of the matter cannot always be ascertained until the latter part of the animal's pregnancy (the period of gestation is nine months), it is obvious that no sane man should buy without a warranty, or he may be a loser, be the seller who he may. As a general rule, cows which are not in calf come in season every three weeks, when, if loose, they will stand and allow other cows to leap upon their backs, or will leap upon the backs of others. This is a sure sign of the 'heat,' but tied up in stalls they do not exhibit anything, more than restlessness, which an inexperienced observer

would notice; the breeder, however, would notice the excitement of the organs, and consequent exudation. In old barren cows this season of heat is often entirely absent, but when on, the animal should at once be taken to the bull; and unless one is kept on the premises, it should be ascertained where an animal of a good milking strain can be found. The fee ranges from half-a-crown to ten shillings. After the visit the cow should by no means be hurried home, or the effect may be lost; and, if the distance is at all great, it is far better to arrange for her to stay the night. It is not at all times necessary that cows of a particular race should be crossed by a bull of the same: one of the best crosses possible is the Jersey or Guernsey and Swiss, or the Jersey and Shorthorn, Dutch or Ayrshire and Shorthorn. Nothing can be better than buying cows which are due to calve in a month or six weeks. About the month of March, in such, the calf can be plainly felt on the right side; they will in all probability be dry, and from the teats on pressing will exude a whitish serum. If not dry they should be at once. Some scientific breeders profess to be able to tell the sex of the unborn calves, stating that if impregnation occurs during the first period of the heat, it will be a female, and male offspring when impregnation does not take place until the last stage. Some gentlemen have experimented in order to test whether the autumn or spring calving is the most judicious and profitable, and conclude that the autumn-

calved cows give the best results; this is attributed to better winter feeding and the young grass during the latter part of the cow's milking year. In drying a cow it is simply necessary to refrain from milking her, and if out to grass, the milk will have disappeared in a few days, but if stalled, the udder will probably swell to a great size, when it should be frequently rubbed and bathed with cold water. During the last ten days before parturition, meal cake, cold root, and all good feeding should be stopped, as more cows fall from high condition than anything else. Her bowels should on no account be constipated; and she should be fed on simple fare, regularly watched, and supplied with good bedding. If the weather is fine she may be out a few hours every day, but not with animals which may, however innocently, do her harm. At one time it was the custom among dairymen to purchase their stock before calving, but the breeds have so improved as milkers, and large milkers are the worst subjects for fever, that, the complaint and consequent mortality being so much greater, they now prefer to buy cows which have already calved. Too much attention cannot be given to the pregnant animals before and after calving; if they have been living well, there is always some danger, for quantities of blood which have hitherto nourished the calf will produce mischief if the animal is not jealously watched until the time comes for the production of milk. Cold and chills must also be prevented, both being

fruitful sources of the disease. With cows expecting their third or fourth calf, or young cows, if any suspicion arises as to their predisposition to fever, one ounce of Epsom salts should be given four or five days before calving, and in some cases a second dose the day before ; in each case administering a good dose of treacle a few hours after the salts. It is also strongly recommended by high authorities to milk suspected cows daily a week before calving if milk is secreted, and in all cases to milk clean the entire week after calving. If a plethoric cow has calved and is suspected of an attack, she had better be freely bled and given one ounce of Epsom salts in an ample drink of tepid water.

Homœopathic remedies are much recommended for cows down with milk fever, and although many are opposed to them, they have so frequently been successful that we give the prescription which has many times been administered with effect, viz., ten drops of mother tincture of aconite and belladonna every hour alternately, in a wineglass of cold water. Aconite may be safely given as a preventive. Should such remedies fail, or the owner have no faith in them, he had better in a serious case at once send for the best veterinary surgeon he can get.

A very good test of the health of a cow is the heat of her body, which is normally just below 100°—98 to 100. Hence with the help of a specially made thermometer, the mode of using which any expert will

describe, it can be at once ascertained whether, should any derangement be apprehended, the heat is such as to indicate anything serious. Should it rise to 102, steps should be immediately taken to prevent disease. When a cow has calved, providing she is all right, there is nothing like letting her alone. Should she be very weak, a little gruel, made of any kind of meal which is not binding, will do her good, but in all such cases, where the proceeding is natural, she will display an affection for her calf which, contented as she is, will prove soothing to her, and as good as anything man can give her. It will naturally be considered next what should be done with the calf. If it is to be reared where milk and butter is no object, it should be allowed to remain with the cow, or if it is to be sold to a dealer, it may remain with her until sold, unless the milk is wanted for the house, but we recommend that all youngsters, except those to be reared for beef or dairy, should be weaned a day or two after birth, and fed regularly by hand, in all cases giving them the bestings or first milk drawn from the cow after calving, which has a very beneficial effect. At first some little patience will be required to teach the calf to drink the milk, but by allowing it to suck the fingers in the milk pail, it will quickly learn what is intended, and then the chief difficulty will be to prevent it drinking too fast. In a natural state the calf drinks from the teat slowly, and if allowed to gulp its food down too fast, ill results will follow. At first it

should be allowed two quarts morning and night, *i.e.*, four quarts a day, but during the second week the allowance may be increased one quart daily, similar increases being made in the third and fourth weeks. The milk should always have the chill taken off; it is better given as near the temperature of newly drawn milk as possible. After the fourth week a healthy animal should be allowed to nibble at solid food—a little very good hay, sliced turnip or mangold, oil cake, comfrey leaf, &c., and at the same time a change may be made in the milk, giving slightly less by degrees, and adding barley meal or linseed to it, until indeed by a gradual process which the feeder should well observe, milk is at last discontinued altogether. Some persons after the third week give half new milk and half water, others give skim milk, of course with the addition of meal in each case. Calves vary a great deal; some are most precocious, and drink their daily meals readily, quickly learning to eat solid food, and always looking well and giving no trouble; others are the reverse, and require constant attention, and without it they never thrive, but with proper care, regular feeding on the gruel, which should be cooked, and of either linseed, oatmeal, or wheatmeal, with a little condiment sprinkled in it, and not made thick, they are as a rule certain to do well. They should be occasionally groomed with a wisp of straw, and kept free from lice, with good washings of soap and water if any tendency is declared. The litter

should be dry and clean, and the houses should by no means be draughty or cold. Some persons tie each calf to a post in one warm house; this is a good plan where room is scarce; others allow them to herd together loose; this we by no means advise. If however each calf can have a loose box or crib to itself it is certain to do better. They are better in these houses than out of doors whenever the weather is questionable, and on no account should she be out during severe wind, rain, or frost. Some persons question whether an autumn or spring calf is the most desirable. Certain it is that an autumn calf comes into the dairy first.

It is of necessity well fed through the winter, and is able to eat the best spring summer grass, upon which it thrives better than anything else, especially if assisted with a little generous diet, coming in as a winter cow at two years, after having undergone but one winter's feeding, whereas a spring cow as a rule needs to be fed two winters, and must consequently be less than two years, or very much more, before she comes in under similar circumstances. Another advantage which the autumn calf brings is no mean one; she comes in when milk is the dearest, which often means a difference of pounds in value, even between her and her fellow spring heifer which has to be fed two winters.

Perhaps the worst disease to which calves are subject is diarrhœa; it is generally attributable to bad

food, want of cleanliness, or damp, and is often contagious, going through a complete herd. The first symptoms are their discharge, which is yellowish, fetid, and mixed with mucus. It refuses food, becomes dull, the abdomen swells, and weakness increases; the hair stands out roughly, and the animal quickly collapses. If the food given effects no apparent change, it had better be withheld, and the calf fed upon rice gruel, with the white of egg mixed in with it, or on gruel made from starch. It may also have beef tea and any binding farinaceous diet which experience suggests, the food being administered every three or four hours. If the diarrhœa increases in violence, professional help should be sought. Where calves are reared, the males should be castrated before weaning, at about eight to ten weeks old.

It is surprising how successful some men are in rearing calves who have but a poor supply of milk. A large allowance of new milk and artificial food goes a little way where the animal is subject to cold and wet, and by the same rule it often does famously on short commons. The best calf we ever bred commenced chewing hay under a week, and with this and skimmed milk after it was weaned at fourteen days, it did famously. Calves which are to be sent out of doors at three months old should have been dropped at least three months before the very hot weather sets in, or they are better not pastured at all. They should be placed only upon rich dry land, well provided with

shade and water. Soft moist pastures are death to them, and they should be driven into the yard regularly before the dew rises, wet grass being especially unwholesome to them, engendering husk, a complaint which is very fatal. Husk is caused by worms which infest the bronchial tubes, and unless caught in time is seldom cured. Good feeding, warmth, with a prescribed use of turpentine, are the best remedies.

To return to the cow. There are so many methods of feeding praised by practical, and recommended by non-practical men, that it is needless to do more than describe what has been and can be done upon simple diet. One writer who recommends entire stall feeding advises that in summer, green foods, such as lucerne, comfrey, tares, vetches, and clover be given at the rate of from 1 to 1¼ cwt. daily, varying the diet according to what is grown. In the autumn these crops are, as they become scarce, supplemented by cabbage, of course hay, and a little later on with roots of all kinds, which if largely grown and well protected, as hereafter described, will be a very valuable help through the winter. These foods are continued, with the use of more or less hay and straw, until the summer feeding comes in again, the roots being in all cases sliced or pulped and the straw and hay cut into chaff. The addition of two or three pounds a day of oil or decorticated cotton cake in winter makes a great difference to milking cows, but it should be broken and mixed with the chaff.

The chief ingredient in the commodity 'success' is found in the farmer who gives thought to his work, and experiments in his feeding. He will quickly ascertain whether plain, mixed, or cooked food answers the best. Sometimes cooked roots, with meal mixed with them, answer admirably; at other times steamed chaff, heavily sprinkled and mixed with linseed or barley meal, does well; and when milk alone is required in quantity, 80 lbs. of mashes daily, composed of two parts swedes to one part mangolds, with the addition of 1 lb. linseed meal, 1 lb. malt dust, and 2½ of cotton cake, with water as required, and a handful of salt. In addition, the dry feeding per diem is 18 lbs. of chaff, of which one third is hay, mixed with 8 lbs. of mangold or beet. It must be remembered that a cow is compelled to eat sufficient food to provide for the ordinary waste of tissue, before she commences to secrete milk, hence liberal feeding is not only judicious but a matter of common humanity. In addition to those mentioned, there are many other foods which are in request for the cow. Grains are very much given in towns, but without some valuable addition they are of little value, hence where they are used, cake or meal should be constantly given and in liberal quantities. Bran is another capital food, not only as a separate diet, but when mixed with meal, which experience has proved is better so mixed than when given alone. A farm superintendent, however, relates that in changing from

meal to bran, the yield of butter was 21 per cent. more. Malt dust is a capital factor in the diet of a cow, and is withal moderate in price. It is better in a mixture than given alone, but in all cases it should be soaked before used, as its tendency is to swell. In all cases, mixed foods, mashes, or roots should be given during the day; hay or oat straw, which is nearly as good, being given in the night if given at all. Roots are especially bad on an empty stomach, on which more would be eaten than would be beneficial, and turnips impart a flavour to butter unless they are cooked, although this flavour may be destroyed by adding a little sour cream to the pail of new. Of all roots, perhaps parsnips are the best, the colour and flavour of the butter they produce being of the richest. Where flax is grown it may be utilised, and cut into chaff it is excellent. Furze too, well bruised, is a valuable diet; the new masticator is an invention of great use to furze consumers. For winter feeding the following diet is given by a very large and experienced farmer in the 'Agricultural Gazette.' 'Four times a week a mixture of two-thirds oat straw, and one-third damaged hay chopped and mixed with 1 ton of pulped white turnips, 2 cwt. soaked malt dust, and 2 cwt. palm nut meal. The cows not in milk live on this, with hay for fodder. The cows in milk have 1 to 3 lbs. of rice meal mixed with their chop, and 2 to 5 lbs. of decorticated cotton cake, and a few whole man-

golds daily according to the yield of milk.' The palm nut meal, if good, costs about 6*l.* per ton ; malt dust a little less, the cotton cake 8*l.*, and rice meal is a very cheap food, being somewhere about half the cost of corn meal, although a word of caution may not be unnecessary. Professor Dyer has stated that much of the rice meal in the markets contains a large adulteration of ground husks without any appreciable portion of real rice, which is a most valuable diet. Another experienced feeder gives his cows a mixture composed of hay and straw chaff in equal parts, 1 cwt. cabbage or mangold, 24 lbs. each of rice meal and malt dust, with a small addition of grains, the chaff being first steamed or damped, and the cows fed five or six times daily. In addition each cow has 5 lbs. of cake. The straw and cabbage are increased when more is grown. The same breeder gives his yearlings 2 lbs. of cake daily, whereas the calves are fed upon the cows' mixture and 1½ lbs. daily of cake. Condiments are often of great value, and much relished by cows ; if mixtures are seasoned with a good spice now and then, much good will result. A good mixture is 1 lb. each of coriander seed, caraway, pimento, and licorice, to 10 lbs. of fine maize meal. This is cheap, easily prepared, and will answer as well as the expensive foods advertised. There can be no doubt that straw and poor hay would be much more largely consumed by cows if chaffed and mixed with more condiments,

corn, pulse meal, or cake, and with a most satisfactory result, both in the yield of milk and manure. In the first place these feeding stuffs supply the fats and albuminoids in which poor hay and straw are deficient, and in the second place they supply a rich manure at a minimum of cost. Hay should be upland, well manured, and early cut, when it is rich in nitrogen; later cut hay is more fibrous, less digestible and palatable, and wanting in albuminoids. The shells or husks of oats are a good food when given in conjunction with something more substantial. When cows are stalled they should be allowed to drink twice daily as much as they like. Where they are allowed to graze in the meadows or are tethered, a good practice where pasture is limited, they should not be allowed out all night after the frosts commence, the cold dew being injurious, and the cold itself stops the flow of milk. Suffice it that they are turned out during the day when the dew has gone until the frost or snow comes. The cowman should feed, remove the manure, and milk them by six throughout the year, the milking being regular every twelve hours. In feeding he should if possible give the mashes warm, and at all times avoid giving solid corn. In Ireland potatoes are largely used for cows, being boiled and mixed with bran and warm water, and sometimes with maize or bean meal. In all cases and at all times, the cowman should remember that salt is a valuable relish, and a piece should be in every manger. Should it be necessary to fatten a cow,

she should have 3 to 4 lbs. of cake daily, together with 1 to 1½ cwt. of pulped turnips and plenty of hay. It may be mentioned that where fern or bracken can be obtained it makes admirable litter for cows; it can be dried and stacked as hay. It is extensively used at Addington Park, the Archbishop of Canterbury's, and is highly approved by the steward, Mr. Whalley, being as valuable in its manurial properties as straw. A word of caution with regard to evergreens will not be out of place considering the poisonous qualities of some of them. We especially guard readers against yew; many animals have died from its effects, and in severe drought, when cows pay little regard to fences, they often nip off the young shoots, which in the many cases we have known almost always prove the most dangerous. True it is that many animals have eaten yew unharmed, but the probability is that the trees of which they had eaten were not of the deadly kind; at all events, until science accurately defines which are poisonous, beast should not be allowed access to any. The dead leaves and branches have often caused death.

In managing the cows, the next thing in importance to feeding is milking; with a bad milker a good cow will quickly be spoiled, whereas a thoughtful kind milker will improve even good cows. Cows have often been condemned for their poor yield, when, upon testing, the milker has been found to be at fault. Nothing is of more importance than regularity, as

when a cow is milked at a certain time her udder is full and fit when she ought to be milked, so that if delay takes place, she is at a standstill instead of secreting milk for the next milking. The udder is formed of two glands placed longitudinally, each of which has two teats, hence the custom of milking one teat on each side at the same time instead of the two teats nearest the milker, which latter plan is most objectionable. If the milking is performed three times a day, and most authorities believe that three milkings give a larger yield, the first should not be later than five, the second at midday, and the third at seven; they should not, at any rate, be nearer than seven hours apart. The cows should be milked perfectly dry, or the yield will diminish, thus with an empty udder the cow is encouraged to secrete sufficient milk to fill it; but with the udder partially empty, the demand being less, the stimulation is also less, and she supplies a quantity which will probably become a precedent for the future, when, in all probability, the poor animal will be blamed. The greatest cleanliness should be exercised in milking, the milker's hands being washed, and the udder also, but here, unless the master's eye is early on the watch, it is not likely his orders will often be obeyed. On commencing, the cows should be spoken to, gently stroked or handled, and the teats rubbed before milking, and a light-hearted milker will please his cow by singing or humming a tune during the operation. The fingers should

not be used roughly, and the teats should be stripped at the finish to obtain the last drops, which are the richest, as are the first the thinnest. A sore udder should always be noticed, for sometimes milking is most painful to the cow, and necessitates a tube, which can be purchased cheaply, but is not to be recommended except in such a case. Sometimes the udder is covered with warts ; when this is the case they should be pulled or cut off, and the place cauterised, or they are certain to come again. If a cow has a temper of her own, and determines to kick over the pail, she may be managed with a little patience and determination. The worst of kickers, and they are generally good milkers, may be tamed down if, while the man is milking, the master stands at her head, stroking her with one hand and feeding her with corn or something tempting with the other. An incorrigible cow may, however, be generally beaten by the use of a fetter ; when fastened on her legs she will at first try hard to get it off, but finding her efforts useless she will submit. It is always advisable to milk heifers with their first calf, as it assists the development of good milking properties, and it is well to handle her teats frequently before she calves, as this often saves the animal a great deal of pain, and sometimes prevents the loss of a quarter of her supply. All these little matters, small and simple as they are, should be inherent in the man who manages or keeps cows, and they will repay him a hundredfold ; his heart should

be in the right place and his animals will love and confide in him as he is attached to them. Most cows which are well treated are such gentle, loveable creatures, that none but brutes, in the shape of men, could treat them harshly. The curry-comb should be as permanent in the cowhouse as it is in the stable, and a careful cowman, with his pride put to the test, will never allow his charges to be dirty or attacked by parasites. For the latter there is nothing better than strong soap and water, to which a few drops of carbolic acid have been added; or a lotion of stavesacre seeds, half-a-pound well boiled in a gallon of water, will annihilate the lice. Sometimes a cow becomes addicted to the habit of sucking her own teats. To prevent this a leathern muzzle or strap must be fixed round the bottom band of the headstall; it must be studded with sharp points by the harness maker. Should a cow break her horn, it should, if not broken sufficiently to come off, be bound round with tarred rag, when in all probability it will grow together again; the same remedy may be adopted if it comes off, and if the core is not detached with it, it will grow again. Where, however, the core is broken away, it had better be cut even and well covered with cobwebs, then the tarred rag may be covered over. A diseased cow, more especially if she be suffering from tuberculosis, should never be retained; in the first place, her milk is dangerous to health, being infectious and even origin-

ating the disease in man, and retaining its virulent properties even after boiling.

Should a bull be kept, he should have a stall of ample dimensions to himself, and be fed upon good hay with a moderate allowance of the cows' mash or mixture. In summer he will enjoy ample fodderings of green food. Some bulls, such as Jersey and Swiss, may often be allowed their liberty; but as bulls are very uncertain animals, very great precaution should be taken, as the stupidity of some persons at the very sight of one causes them to run and encourages the animal to follow them. A bull with the least uncertain or savage tendency should be rung and never at liberty. If of a breed which has developed the necessity, he should be rung at twelve months with a copper or steel ring of, say, 2½ inches diameter, which is provided with a pointed shield to help it through the thin spot between the nostrils below the cartilage, a hole having been first punched through with a leather punch. When through, it should be wedged together, and the screw, which should be below, be at once fastened up and filed off smooth. In using the punch, the best foil will be a stout smooth stick, the end of which, being about an inch in diameter, is inserted against the cartilage of the nostril. If a bull refuses to be led, a strap had better be fixed to the headstall and another to the ring, both being gently pulled at the same time.

Before concluding our chapter upon the cow her-

self, it may be advisable to offer a few simple physiological remarks. Presuming that one of the best of its kind is sought, her age should be first of all observed. This may usually be ascertained by examining the rings on her horns. If she has one ring well developed she is three years old, if two, she is four, and if three, she is five years, and so on. Her teeth are also an indication of age to the expert who puts less faith in the rings, which he often insinuates, and perhaps not unjustly, are altered.

In appearance a cow should be wedgelike, broad behind and narrow in front, the escutcheon, which is seen behind on the buttocks, being a guide as to the promise of milk; this escutcheon, which, although a somewhat modern idea, is really only a new interpretation of an old fact, is formed by the peculiar growth of the hair, which, growing in two directions, forms a fringe. The greater the extent of the fringe the greater the yield of milk, or, to put it more plainly, the wider the cow across the buttocks, the greater is her milking capacity; at least this is the rule. Another test of a milker is the development of veins in front of the udder: in some cows they are extensive, in others, though present, they cannot be detected without pressure. The veins running upwards behind the udder are also very desirable in a cow, and are a sure test of a milker. The head should be small, cheerful and neat, a sure sign of health being the dew on the animal's nose. Small fine horns are desirable, and

most good cows have a 'dewlap,' or portion of loose skin, hanging below the neck. The forequarters should be lightly made and narrow, and the hind broad, to give the body its proper shape. The back is preferred straight, although it is characteristic to have high tails; the ribs deep and well expanded, the legs short and fine, tail long and thin, udder fine, square and deep, though not hanging—the teats being well apart—the hair fine, and the skin, or, as it is technically called, the 'touch,' soft and delicate. A cow is due to calve in nine calendar months, speaking roundly, but as a matter of fact she generally goes 285 days, and she continues in her prime until about eight years, and some good, well-kept animals, until ten years.

The arrangement of the cowhouse will be regulated by the number of cows kept; one or two cows may be stalled, each stall being 4 feet 6 inches to 5 feet wide. Double stalls have many objections, and we cannot recommend the custom of turning the cows loose in a shed without stalls; its inconveniences are obvious. The stall should be wide enough, and if litter is used it should extend no farther than the heelpost, behind which is the drain. The flooring should not be of granite, pitched boulders, or brick, but either of sandstone or concrete, and laid so that it allows the liquid manure to drain into the gutter. Some persons have floors of beaten earth, others again use sparred floors; the objection to the former is, that it cannot be kept

sweet, retaining the manure, and to the latter that, although it encourages a saving in litter and saves more manure, it is not comfortable for the cows. Each stall should have a water trough, a manger, and a rack, and if the trough is fitted with a pipe to fill and empty it, so much the better. These had all better be made of iron.

Some farmers halter their cows to a ring screwed in the front of the manger, others tie to a ring which slides upon a perpendicular iron rod 4 feet from the ground, so that when lying down the animal is not inconvenienced by being tied above her head. In no case should she be tied so that she cannot lick her hind quarters. If many cows are kept, a double row of stalls will prove far more happy than any other plan, a passage of 3 feet running down the centre of the building, with the mangers and racks on either side; thus the cows are, as it were, head to head, and can be fed without being disturbed and with less trouble. The passage behind, whence littering is managed, should be a foot wider at least. In every case ventilation should be perfect; provision should be made to afford ample supplies of fresh cool air in the heat of summer where cows are stalled; to prevent draught and rain reaching them in rough weather, and excessive cold in winter. The drains should be as scrupulously attended to as the feeding, and never allowed to be blocked, or they may become fertile sources of fever.

We may now sum up in a few words. A bad cow, *i.e.*, one yielding no more than 300 gallons in a year, is a direct loss; a good cow badly kept is a loss; but a good cow will prove the delight of a family, an important factor in their health and strength and many simple gastronomic treats; or as a mercantile investment she will bring in 20*l.* a year. A farmer who keeps several, tells us that his cows average 22*l.* per annum, although he sells his milk at 2½*d.* per quart or 1*s.* 9*d.* the barn gallon of seventeen pints. If a cow gives twelve to fifteen quarts a day for the first four or five months, and from six to eight during the remainder of her year of eleven months, allowing one month when she is dry, she is a valuable animal, and will pay her way whether her milk is sold, made into butter, or given to pigs.

CHAPTER VI.

THE PIG.

Breeds—Management—Feeding—Breeding—Young—The teeth.

IF to a country resident, pig-keeping for profit were no inducement, surely the pleasure and comfort of home-grown pork and home-cured bacon would at least procure a tenant for one stye. To those who feed their own pigs for table the difference between it and the meat sold generally by town butchers is so marked, that an outsider may well wonder what causes the difference. Town-fed pigs are often mere scavengers, kept for the purpose of eating the refuse of a factory or a slaughterhouse. Is it possible that pigs shut in a close, and necessarily unwholesome stye, on animal food, can compare in any sense with one fed on milk or corn, with a full share of green food? The rich meat so well appreciated in country houses is almost unknown in large towns, for it could not be sold at salesman's prices at a profit, and when sold alive it usually finds its way to the country butcher.

The pig is not half so dirty, so stupid, or so

indolent as he is often said to be. His dirt arises from his hard work, unless his stye is foul, and no animal strives harder to clean itself when its day's work is done. Provided with powerful jaws and a strong snout, it will root up the earth in a most persevering manner for food, its sense of smell being remarkable, and it will travel far and wide for a whole day, working the whole time for food, and indeed, unless rung, the damage it will do in this short time will at once exonerate it from the charge of laziness. No one acquainted with the practical management of pigs can possibly admit that it is stupid; on the contrary, its sagacity is most remarkable. It is an omnivorous animal and has twenty-eight teeth, of which there are six grinders or molars, six incisors, and two canines in each jaw; and as in other animals, its mouth is a sure test of its age. At its birth the pig has four well-grown teeth in the side of each jaw. At the expiration of a month two incisors appear at the top and two at the bottom, all being in front, and these increase so considerably in size by the seventh or eighth week, that the little animal is able to feed of itself, more especially as it has now cut three molars in each jaw. At three months old two more incisors appear in each jaw, making their full complement of eight, and the completion of its first set. Up to six months the teeth gradually increase in size, but after this age they begin to decrease, more especially if the animal works

for much of its living. About the age of nine months the first tusks and incisors are superseded by permanent teeth, but it must be remembered that castration materially affects the size of the permanent teeth, and at this time also it cuts the fifth tooth in position, or second permanent molar. Again, on reaching twelve months the middle incisors are followed by permanent teeth; thus, at this age the number of incisors in either jaw will be two, and the molars give way to permanent teeth. From this time to eighteen months, the permanent teeth already through are developed, and at the end of the period the remaining temporary teeth, viz., the four incisors and the last molars, fall, and are succeeded by the permanent teeth, which reach their full growth in about three months. It will be seen from these remarks that the condition, as well as the size and number of the teeth, must be valued in determining the age. After twenty-one months, when the teeth become smaller, age can only be guessed by their condition, although in a boar the size of the teeth will be some guide.

The pig is provided with twelve teats, from which it may be inferred that twelve little ones are the proper quantity to bring up with a sow; at any rate, it is seldom wise to allow her more, even when she is large and vigorous and bountifully fed. A sow rearing twelve each time is a splendid animal, and should be highly prized. Some sows seldom exceed eight or ten, rearing these well. Others again have large

litters, and we know of one which had sixty in three consecutive litters—nineteen, twenty-one, and twenty, —but though a splendid animal, she laid on some of them on each occasion, which was quite as well. The period of gestation with the sow is from sixteen to eighteen weeks, the farrow being generally looked for in about 115 days, but some animals are eighteen to twenty weeks. The female is usually fit to breed at from nine to ten months, although we do not recommend her being put to the boar at such an early age, fifteen to eighteen months being a better time, as she will not only grow in the interim, but throw stronger and larger pigs ever after; and instead of being stunted, will continue to grow, as the pig should always do until the age of five to six years. Where, therefore, a boar is running loose, yelts (the females which have not had young) of the ages of from nine to fourteen months, should be shut up, unless he is temporarily confined daily for their outing. When old enough for the boar, their readiness must be watched for; this will be shown by their uneasiness, redness and development of the parts, and they should be at once admitted to his stye, or the season may go off, and three weeks be lost. Sows generally come in season every three weeks, and should be closely watched in consequence, or where there are many, very serious losses may occur, as indeed they do, for pigmen are proverbially careless, and if they have allowed the time to pass,

nothing is easier than for them to declare that the animal has missed. The master should therefore rigidly see to such matters himself. If a sow fails to conceive, and this will be known in three weeks or so after her visit to the boar, she should be tried again and again, and if she fails three or four times let her be fatted and killed. We have referred especially to this matter of breeding, inasmuch as it is a subject proverbially unnoticed by compilers of so-called handy-books, whereas it is, we know too well, about the principal branch which most amateurs are ignorant upon, and upon which they are unable and unwilling to enquire. Sows should be allowed to have two farrows a year, one in the spring and a second in the autumn. Thus, supposing one to litter in March, she will at the end of eight weeks, when weaning takes place, be fit to take the boar, and should farrow in September; she will take the boar again in November, and again litter in March. During the time she is in pig she may be let out on the pasture land, and in summer will entirely find her own living; in autumn she will do the same, acorns, greens, beech nuts and such like, providing against the absence of so much grass. If she can be let on the stubble, so much the better. An in-pig sow, however, should not be fat, especially as she approaches parturition, for although we don't share the opinions of those who fear to litter a fat pig, yet there is an element of danger which it is well to avoid. Certain it is that breeding sows do

not need feeding where there is plenty of grass, except in winter, and the improved breeds will even keep up their fat upon it alone. When the litter is expected, the sow should be shut in a stye by herself, and if her temper is unknown she should be watched, or she may overlay or eat her pigs. In that case they should be removed as they appear, into a hamper, and covered with flannel until all have arrived, when her bed may be re-made, a hot mash of meal provided, and her young ones given to her to suckle. Most animals make their own beds preparatory to their confinement, but others make no preparation whatever, and these are usually found in the morning lying happily with their young family around them. When a sow has a litter she must be well fed, and nothing is better than dairy feeding; buttermilk, whey, or skim milk, all these are admirable. She should also have some green food, which the wash-tub should furnish from the house. Failing milk, meal should be given, thinned with water; at first barley meal only, followed in a week by a mixture of barley meal and pollard. Sometimes grains are given, but they should be only in addition to the normal meals, which should be at least four a day. At the end of ten days the sow may be let out for a few hours to graze, and at the expiration of six weeks the rail in the breeding stye may be lifted to permit the little ones to pass through and feed themselves, which they will very readily do; they may also be allowed a run out

with their mother. By this plan they will at the end of eight weeks be large and plump, able to feed well of themselves, and fit to sell or wean. The sow's food should at the same time be materially lessened until her milk has gone, when she may have a few days' barley meal feeding to help her coming into 'season.'

The question as to the disposal of young pigs is one on which there is some difference of opinion. If they are kept solely for cash profit, they should be immediately sold when weaned, and a well-bred lot will always draw the dealers, or even sell well in the market. If they realise 20*s.* each, they do very well, but sometimes they make 25*s.*, or go down as low as 15*s.*; the breed and the feeding usually making all the difference. Some feeders give peas during the seventh and eighth weeks, others boiled maize, either food making a great difference to the little one's value. Should it be found necessary to add to the stock, one or two of the finest yelts may be selected, and allowed to run out with the store pigs by day, receiving at first three feeds daily in the stye, and gradually reducing the feeds until two only are given. If a boar is to be kept, he may be allowed to run with them in the same way, but if porkers are required for family use, the requisite number of young ones should be selected and at once castrated, and then relegated to a fatting stye, where they may receive four to five feeds daily, until fit to kill.

Castration is a simple operation, and though not an expensive one when a man is employed for the purpose, it should be learnt and done at home. The animal is caught and held firmly by an attendant, the operator seizing the testicles one at a time, making an incision across the bottom, pushing them or pressing them out, and cutting the cord. It is the work of a minute. Sometimes the operator tears them out with his teeth, instead of cutting the cord; this is usual with older pigs, and in cases where boars are castrated, which they very often are, by dealers. If the young pigs are to become bacon hogs, it should only be where there is an abundance of food, as we do not believe these ever pay their way where all the food has to be purchased. Pig-keeping, then, resolves itself into an adaptation of ways and means. If there is plenty of dairy waste, porkers, even baconers, may be kept; indeed the same animals may be kept where potatoes and roots are in abundance; but in the absence of these in any quantity, we would sell all the youngsters as they are weaned, unless it be those retained for stock purposes. For this purpose a quick-growing breed is required, and none is better than the large-bred York, or the large York or Lincoln breed crossed with the Suffolk. Indeed, any large breed crossed with the latter would do well; on the other hand, if store pigs or baconers are required, we would select the middle-bred York, or the pure Suffolk, or the Berkshire. All these, especially the Suffolks, are very

superior to anything known. They are not large eaters, and fatten much quicker and upon far less food than ordinary pigs; and when sold should command much higher prices, carrying, as they do, much less bone, and more meat of a better quality.

In selecting a stock animal, the requirements demanded should be length and width of body, especially width in loin, shoulder, and jowl; to this, proportionate depth should be added, and the result will be fine hams and shoulders. The legs should be short and the bone small. The head should be very short and thick, the cheeks massive, deep, and broad, and the snout turned up; the eyes and ears small, and the latter erect. The neck is also very broad and thick. A fine small curly tail is another sign of breeding, and to this add plenty of long strong bristles, a very great point in a breeding pig. If not fat, the animal should have a quantity of loose skin, which will show how readily it can be fatted, and the body filled out. In purchasing a sow, ascertain how she is bred, how old she is, how many and what litters she has had, and if in pig, require a warranty to that effect, as there are many dealers ready to take advantage of the unwary, and a barren pig, in addition to the loss of value, causes a loss of so much time, as well as annoyance.

Pigs should at all times have warm houses, and at the same time well-ventilated ones; warmth causing them to require less food, and ventilation giving

health and vigour. Of pure breeds it is not our purpose here to say more than is necessary to a practical end. The Berkshire is black, sometimes slightly patched with white, long in the body and also rather long in the head, fine in bone, a quick grower, but taller and narrower than the Suffolk; the latter is the thickest and shortest in head and leg of all breeds; it carries larger hams and cheeks than any breed of its size, and is the smallest eater of any. Suffolks are both black and white, and though scarcely of a middle breed reach 50 and 60 stone. Yorkshires are white, and are divided into three varieties; the small, middle, and large breeds, averaging in weight from 40 stone in the small, to 100 in the large breed, the latter being the finest known of any large-sized pigs. No breeder need go beyond these leading varieties; and those who recommend Sussex, Irish, Norfolk, or any other mongrel, are not to be listened to, as they are all infinitely inferior to the improved breeds we have mentioned.

Young pigs should be rung when they leave the mother, but this matter, like castration, can be more readily learned in one practical lesson by the local smith or farrier. Young pigs unrung are persistent in their damage to growing grass and gardens, indeed, wherever they go they will uproot the earth in search of roots or hidden food.

A variety of foods are used for pig-feeding; foremost come barley meal, pollard, peas, maize, buck-

wheat, rye, brewers' grains, potatoes, mangold wurzel, turnips, beetroot, lucerne, grass, clover, cabbages, and garden produce and refuse of all kinds. Dairy refuse, refuse of starch mills, rice, the waste from hotels (a food which is common in large towns, where it is contracted for by some large pig breeder or feeder), and lastly acorns, linseed cake, and comfrey (a green food described later on) of which they are very fond.

Of the value of all pulse and grain we need not speak, it is too well known, but of potatoes we may say that boiled they are very good, and much relished; they fatten readily, especially in combination with milk or meal. Roots and green foods are valuable adjuncts for fattening, and admirable foods for store or breeding pigs. Rice is a ready-fattening food, imparting great flavour to the pork, and linseed cake can be recommended for the same purpose. It is well to fatten upon roots or potatoes until the last three weeks, when peas or maize should be used to impart firmness to the flesh, or, what is quite as well, or even considered better by some, the animal may be fattened upon carrots until the last fortnight.

In a good yard either of the following rations may be adopted with success for adult pigs.

(1) 3 lbs. of boiled maize daily per pig, with ample allowance of boiled potatoes or carrots.

(2) 2 lbs. barley meal, 1 lb. pollard, with ample potatoes or carrots.

(3) 3 lbs. peas daily, with ditto.

(4) 3 lbs. rice per day, with ample allowance of skim or buttermilk, or whey.

(5) 2 lbs. linseed cake, with ample potatoes or roots boiled.

(6) Ample dairy waste, only with roots, comfrey, or greens.

The manure of the pig is a most valuable fertiliser, and should be systematically collected, being in itself a large element in the economy of pig-keeping. Taken altogether there is no animal so much relished, none more useful. The innumerable dishes provided from it in a country house make it a general favourite. There is hardly a particle of this prolific animal which has not its use. The head is valued for making into brawn and for salting, the feet and the intestines are considered great delicacies, and the loins and hams are simply English institutions. For breakfast, throughout our world, bacon is esteemed by the rich, and fat pork by the poor, sausages by all. Of the diseases of the pig, little need be said beyond reference to the simpler ailments, the more complicated being left to a professional man by all wise masters. No animal is so difficult to manage, hence its medicine is usually administered in its food. Here we may remark that an occasional handful of salt or a weekly dose of brimstone in the meal will tend to keep the stock in good health. This should be an invariable rule, as few diseases occur where diet, cleanliness, and this necessary rule are followed. In

cases of apoplexy, when the animal falls insensible; fevers, phrenitis or frenzy, tetanus, epileptic fits, inflammation of the lungs, quinsey, or the usual pig epidemics, a qualified man should at once be sent for, or danger more serious may occur. But in such a case as colic, when the animal exhibits great pain in the bowels, a remedy may at once be found in castor oil, and hot ale with ginger, or of cold when coughing and sneezing are frequent, with the usual symptoms of catarrh; a warm stye should be provided, with warm food well gingered, with about four grains of sulphate of copper morning and night. Diarrhœa, too, may be combated successfully if taken in hand when it first appears, or danger may be apprehended. For pigs, under six weeks, a teaspoonful of the following mixture: prepared chalk 1 ounce, catechu ½ ounce, ginger 2 ounces, opium ½ drm., mixed in about half a pint of cold water. For larger animals give a proportionate quantity. For worms, turpentine capsules are the best, and for measles, which are attended with red patches, hot skin discharge from the nose and eyes, feebleness, high pulse, loss of appetite, and cough, there is nothing better than a dose of magnesia and cooling food, with greens, avoiding barley meal, maize, and peas for a time. Draught, or anything tending to give the animal cold, and bad ventilation, should be particularly guarded against.

CHAPTER VII.

POULTRY.

How to commence—The varieties described—English, French, and American—Management of the yard—The egg—Fertility—Sitting—Hatching—Rearing—Feeding—Houses—Runs—Vicious fowls—Vermin—Diseases—Ducks—Breeding and management—Geese—ditto—Guinea fowls—Turkeys—Artificial hatching.

IF the soil is suitable, and there are good buildings and plenty of run, without interfering with the garden or other cultivated ground, poultry may be extensively kept, and in this chapter we shall succinctly describe the various breeds, without regard to exhibition qualifications, and explain how they should be bred and managed. Works on poultry are not only numerous and elaborate, but they treat of their subject in a manner too little suitable to the utilitarian and too much for the fancier, who in many cases breeds for feather, without regard to the table properties of the breed. We do not find fault with the fancier, far from it, his pets have helped to provide far more eggs and chickens than would otherwise have been grown at home, but what we do say is,

that the ultimate uses of the domestic fowl must not be lost sight of.

Poultry may be started either by the purchase of eggs and a few sitting hens in early spring, or of the requisite number of fowls at any time ; though the most suitable season is winter, that they may get accustomed to their new home by laying time. Common fowls may be purchased in any village, but we do not recommend them, and pure fowls and eggs are constantly advertised in the papers devoted to live stock. Eggs cost from 4*d.* to 1*s.* each of the fine breeds, whereas fowls may be obtained from 5*s.* to 20*s.* each. Great care should be exercised in a purchase, and none but reliable, well-known breeders dealt with, or the eggs may turn out to be valueless and the fowls not worth one half what they cost. Young fowls should be plump and strong, the breast-bone soft and slightly pliable, the face bright and young, and the legs smooth in texture and free from spurs. Females are called pullets during their first year, and the males cockerels; the cockerel has no spur until eight or nine months old, and this does not assume the hard pointed form until his second year.

It having been decided as to whether eggs or fowls shall be purchased, we will describe the varieties chiefly bred in England, to assist the reader in his selection of a breed.

The *Dorking* is an old English fowl, very large, heavy, and white in flesh, and a fair layer. Dorkings

are generally considered to be the largest, whitest, and tenderest birds on the table. The breed is not on all soils a hardy one; chalk or a dry porous soil suits it best. In shape it is very deep, square, and broad, with very short legs, five toes, the fifth curled up at the side, white legs, and a single or rose comb. In colour the chief variety is grey, the tail black, and the hackle, *i.e.* the neck feathers, silvery striped with black. The next variety is the silver grey, in which perfection of colour marking is material if bred for exhibiting or sale. The neck, shoulders, and saddle are silver, the rest black; the hens are grey in body, and have striped silver hackles. White Dorkings have rose or double combs, and are not so large as the coloured. Cuckoo Dorkings are barred in the plumage like the cuckoo, and also have rose combs. All Dorkings sit well, and are the best of mothers, staying with their young longer than most breeds. Fine cocks weigh 10 to 13 lbs., and hens 8½ to 10½ lbs.

Brahmas are an Asiatic breed, the origin of which is entirely unknown, but that they are a manufacture from Cochin stock is undoubted. Some twelve or fifteen years ago the Brahma was plain in appearance, ugly in feather, and altogether imperfect; now it is symmetrical, pure in colour, marvellous in marking, and the chief breed in the country. This is owing to the ingenuity and determination of the fanciers who have cultivated it, the chief of whom is Horace Lingwood, who once refused 250*l.* for five of his birds.

The Brahma is a large, deep, thick, short-backed bird, covered with a profusion of soft feathers, short and heavily feathered on the legs and feet, short and curved in the tail. It has a small triple, or as it is termed, a *pea* comb, the three ridges ending in a point at the back. Its flesh is rich but somewhat yellow, its legs a deep dusky orange in the dark, and yellow in the light variety. It is extremely hardy, and will lay in the snow, the eggs being a light chocolate colour and very rich. The chickens are very hardy, and may be safely hatched in winter and reared with less mortality than any other breed. Brahmas are good layers, good sitters, and capital mothers, though at times clumsy; they cannot fly well, but if at liberty roam far for food, and are contented and easily kept in confinement. They are large eaters, and nothing comes amiss, but when over their first moult they are prone to fatten internally, and should not therefore have much fattening food. In colour the dark cock has a silver shoulder and wing bow, and a silver neck and saddle, these being striped with black; the rest of his exposed plumage is rich black. The hen has a striped neck, the rest of her plumage being grey, every feather being marked or pencilled with little bars of a darker grey. The light cock is like the dark cock, except that he is white instead of black in body; he has a black tail, a black striped hackle, and black marking on his flight feathers. The light hen is in all respects marked like the cock.

Brahmas are usually in demand at prices considerably higher than common poultry, and farmers and others are beginning to find out that they are a most meritorious breed, valuable in themselves and also for crossing, imparting constitution to common mongrels and delicate breeds, as well as improving them in other respects.

Cochins are in many respects like the Brahmas; they are similar in constitution, proneness to fatten, size, and shape. They lay a similar egg, and are very much the same on the table. The chickens are equally hardy, and the hens almost as good layers, but they are more determined sitters, indeed, no fowl will sit so persistently, and probably no fowl is so clumsy with its young, hence it is a good plan in using them for incubation to hatch the chicks under lighter hens. There are four leading varieties of the Cochin; the buff, the partridge, black, and white. The buffs are self-coloured birds, an even clear golden buff throughout; blacks are an entire green black; and whites a pure white. Partridges are very similar to the dark Brahma, except that the silver of that breed is, in the Cochin, golden, varying in depth of colour, The partridge hen too is very similar in feather to the dark Brahma hen; the ground is a rich brown, and the marking a darker brown; but its marking is closely identical with the Brahma, which only differs in colour. All Cochins have single combs, a point which is sometimes needed to distin-

guish them from single-combed Brahmas, now nearly extinct with us, although largely bred in France.

The *Game fowl* is a breed which has been bred in England for generations. Its chief characteristic is its pugnacity, although probably no fowl is so much esteemed among connoisseurs at the table for its plumpness and flavour. The Game is tolerably hardy, and does well when full grown; it is not large, but much bigger than it looks, the feathers being so small, hard, and close. It is a fair layer of tinted eggs of a medium size, and is very productive of chickens. It is an active fowl, able to fly high and far, and on this account is difficult of management; for a cock will venture away to fight distant birds when he is challenged by their crow, and the hens themselves are very quarrelsome with strange hens. The chickens too commence to fight very early, and cannot be separated without the risk of severe battles, if they are again brought into contact. Game fowls are seldom kept in numbers for market, although many country persons breed them for their own table. The hens sit well, and defend their young against anything; they are, however, very excitable, and unsuitable for sitting anywhere but where they choose. They are attentive and patient mothers, and taken altogether are a noble variety. There are many colours, owing to various crosses, but the four standard varieties are, Brown-breasted red, Black-breasted red, Duckwing, and Pile or pied. The Brown-red, unlike the other colours,

has a purplish or 'gipsy' face, a black eye, and very dark legs, the others having red faces, red eyes, and willow legs, although some Piles have yellow legs. In colour Brown-red cocks are black and gold; black being the ground colour, with golden hackle, shoulder, and saddle, and the breast feathers laced or edged with the same tint, hence the term Brown-breasted red. The Black-red has a black breast, in fact, an entirely black ground, with a brighter golden hackle and saddle, and shoulder of a deeper colour; the bars of the wing, formed by the covert feathers, are steel black, and the ends or bow is bay. The Duckwing is similar to the Black-red in all but the colouring, the ground being the same. His hackle is straw-colour, shoulder and back maroon, and saddle feathers a darker straw. The pile is a fac-simile of the Black-red, substituting a white ground for a black one, indeed he is often called a White-breasted red. The Brown-red hen is a metallic olive-black, with a golden hackle striped with black, and a breast laced like the cock. The Black-red hen is a partridge colour in body, with a salmon breast and golden striped hackle. The Duckwing hen has a silver-grey body, a salmon breast, and silver striped hackle. The Pile hen has a creamy white body, a light chestnut-and-white hackle, and a chestnut breast. There are also Black Games, Hennies, or birds in which the cock is hen-feathered, and White Game. It is the universal custom to 'dub,' or cut off the combs, ears, and wattles (*i.e.* the gills)

of game cocks, at about the age of six months. Like docking horses and cutting dogs' ears, it is a custom more honoured in the breach than the observance, for the public, who have no antipathies in such matters, are beginning to find out that cocks can fight just as well without a comb, and kill each other quite as rapidly. The chief features in the build of the game fowl are its length of leg, shortness of wing, breadth of chest, and narrowness of stern.

The *Malay* fowl is taller than the game, equally hard in feather and plump in body, but coarser and less beautiful. It is a cruel fowl, and carries its character in its face. The comb is a small lump without definite form, the neck is very long, the feathers scanty, the shoulders very prominent and wide apart, the back long, the tail rather short and drooping. In weight a good cock averages 8 to 9 lbs., and a hen 2 lbs. less. The legs and beaks are yellow, and the face red. In colour Malays vary; there are Black Reds, in which the ground of the cock is black, and the other parts a deep rich red or a bright golden red, the hens varying from a light brown to a dark cinnamon, some having the feathers edged throughout with black. There are also Black and White Malays. On the table, Malay chickens are esteemed, the prime parts being well developed; they are fair layers, and though they sit steadily, are not reliable, but at times rather cruel mothers. There is a variety of fowl in the west of England, there called *Indian*

Game, which, although not the real Indian fowl, is a species of Malay, and which is very similar in size and general appearance. It is, however, superior for purposes of profit, a better layer, better on the table, and a gentler mother.

The *Spanish* fowl is better known in London and some of the large towns, than in the country. The hens do not sit, but they are good layers of large white eggs, the highly bred specimens not laying so well as others. Spanish are more delicate than most breeds, and are not esteemed by poulterers on account of their black legs and spare bodies. They are black in plumage, and have large single combs which fall over to one side in the hens, except during moulting season, when they are usually smaller and erect. Their faces and ears are very large, broad, and deep, and composed of a kidlike white, which is very beautiful, contrasting admirably with the velvety gloss of the plumage.

Minorcas are similar to Spanish in comb, colour, and build, except that they are shorter in leg and a little deeper in body. They have, however, red faces and white ears, and are hardier than Spanish. They are better layers of large white eggs; are plumper when killed, although not first-class table fowls, and do not sit. There are also white Minorcas, and a breed of cuckoo-marked birds called *Anconas*, which are essentially of the Spanish family.

The *Leghorn* is another fowl of the same race, and

although quite new in England, it is already widely appreciated for its laying powers and constitution. It is comparatively a small fowl, very active; it does not sit, lays a large number of smallish eggs, and is fairly esteemed on the table. The chickens are precocious in the extreme, as well as hardy; and the pullets are readily brought into laying by the September of their first year. There are known to English breeders the Brown and White Leghorn, although Americans profess to breed cuckoo-coloured and black as well. The Brown Leghorn is coloured almost exactly like the Black-red Game, but its plumage is not so rich. Leghorns have short yellow legs, short thick bodies, long erect tails, immense red single combs and wattles, and large white ears, the latter (termed *lobes* in all fowls) being more yellow than white in most specimens.

The *Andalusian*, another valuable fowl of the same family, is a slate-coloured or blue bird, the cock having a velvety black neck and saddle, and the hen a black or deeper slate edging round every feather. The build, comb, ear, face, &c., are like the Minorca; to which the Andalusian is similar in constitution and productive properties.

The *Hamburg* is a fowl which is chiefly bred for feather, marking, and colour; and is perhaps the most perfect triumph of the poultry-breeder's art. It is a small fowl, the Pencilled varieties being the smallest, very wild, active, and shy; it can fly like a pheasant,

and never sits. It is, though a delicate bird to rear, when allowed its liberty, a marvellous layer of rather small eggs, and is very good on the table, though hardly suitable for market purposes. Single specimens often lay as many as 200 eggs a year, and this, be it remembered, is a breed in which utility points are never dreamt of. Where, however, these are disregarded, the bird's constitution and size can be greatly improved, and its laying property augmented. Crossed with the Brahma it makes a large fowl, very hardy, a fine layer, and good for market, the hens sitting well, and it may here be remarked that all cross-bred hens sit—even the products of two non-sitting races—although these do not sit so steadily as others. Hamburgs are chiefly bred in Yorkshire and Lancashire, where almost every town has an annual poultry show, in which numbers of classes are given for Hamburg fowls. The chief breeder of the variety is Mr. Henry Beldon, of Bingley, who sends specimens to all the principal exhibitions in Great Britain, France and America, and who has greatly assisted in bringing it to its present high state of perfection. There are five varieties of the Hamburg, all of which have double or rose combs, with peaks at the back, red faces and wattles, and round white ears, of great perfection. In all but the Black, the legs are light blue or slate colour, the tails long and sickle-like, the body gracefully, indeed elegantly formed. The Black, which is

the most profitable variety, is remarkable for its marvellous colour or sheen, the plumage in good specimens being simply a green metallic colour, and the legs are dark slate or black. In the Silver-spangled, the ground is silvery white, every feather on the body, except the hackle, being tipped with a green-black spot or spangle; on the pointed feathers these spots assume a diamond shape, but on the round feathers the spangles are quite round or moonlike, which has caused the birds to be called in Lancashire 'Mooneys.' The beauty of the marking cannot be imagined, the moons forming two bars across the wing, which give a handsome appearance, and the spots on the ends of the clear white tail feathers are very elegant. The Golden-spangled Hamburg is very similar to the Silver, although in place of the silver ground it is a rich golden bay, the spangling being still greener than in the Silvers. The tail, however, is quite black, and the neck hackle striped with black, every other point being the same, and in both breeds the hens resemble the cocks in colour and marking. The Silver Pencilled cock is a more fragile and delicate-looking bird, a little more elegant in contour, and of great beauty. His body is a clear pure white, throughout the exposed feathers, but he has black marking on his wings and under parts. His chief point of beauty, however, is his tail, which is large, green-black, and every feather

edged with white. The hen has a clear white neck and a white body, every feather of which is crossed with several small bars or pencillings of green-black, even to the end of the tail. The Golden Pencilled cock is a self-coloured, golden bay bird, with black markings in the wings, and a large black tail edged with golden bay; the hen to match him resembles the Silver hen, except that her ground colour is golden bay.

The *Polish* fowl is more of an ornamental variety; it is a fair layer, a moderate table bird, delicate in constitution, and some trouble in its management, as it must have air, grass, and exercise, yet must never be allowed out in the rain or on wet grass; the moisture clinging to its crest, and giving it cold, and quickly roup. It is larger than the Hamburg, and is perhaps the most striking variety known. There is no comb, but the head is covered with an enormous bunch of feathers, called a 'crest,' which hang over the sides in symmetrical form in good specimens. It is jaunty in its carriage, has a beard and whiskers, blue legs, and is moderately square in build. The handsomest of the Polish varieties is the black with a white crest, the crest of the hens being as compact and round as a ball, and at all times attracting admiration wherever they are seen. The Golden is similar in colour to the Golden Hamburg, but the feathers of the Polish are edged or laced with black, a very beautiful and accurate marking. In the crest

this marking is also found the first year, but after moulting it becomes whiter. The Silver Polish is similar to the Gold, substituting a silver ground for a golden one. There are also White Polish, and Chamois polish; the former are scarce and the latter more esteemed in France than in England. We have, however, no hesitation in saying that Polish pay well to breed and sell at fancy prices, more especially the white-crested, which is none too plentiful, and always in demand when good in quality. Polish do not sit. *Sultans* are a species of Polish, but much smaller in size and different in shape. They are quite white, have large crests, beards and whiskers, legs and feet heavily feathered with long stiff feathers, and five toes. Sultans are purely ornamental; they do not sit, lay fairly only, and are not large enough for table. They are timid, cannot fly well, and useful only as pets.

French Breeds.—The *Houdan* is the principal French variety kept in this country, and it is deservedly esteemed for its precocity, strength of constitution, and profitable nature. Like the other French breeds it does not sit, but it lays a large number of fine white eggs, and many in the winter when they are most wanted. It is vigorous as a chicken, comes to profit as quick as any breed known, and is very superior for edible purposes, white in skin, tender and plump; in fact it is the Dorking of France. The Houdan is a tolerably large, square bird, with a

flowing tail, mottled black and white plumage, a crest on the head, a comb resembling a pair of leaf-like antlers, a beard and whiskers, mottled legs, and five toes. This breed is rapidly increasing and will always pay to cultivate; it is active yet contented and domesticated, not a great eater, but a good forager, and can be strongly recommended. The *Crêve Cœur*, the handsomest French fowl, is entirely black, with black legs, an immense crest, beard, and whiskers, and for a comb a pair of clean straight horns. It is a sprightly yet good-natured fowl, and the hens especially contented and easily managed. It is a fine layer of a large white egg, is a superb market fowl, and the flesh is very white and delicate, but it is not so hardy as the Houdan; it sells well alive, especially if it is large.

The *La Flêche* is a very striking fowl, quite black, large, with dark legs, large white ears and a pair of horns similar to the Crêve, but it has neither crest, beard, nor whisker. It is also a superb table fowl, a fine layer, and does not sit, but its constitution is variable and not suited to extensive breeding.

Among other French races are the Breda; the Du Mans, a common-looking, big Black Hamburg-like fowl; the La Bresse, a Minorca-crossed, Silver Pencilled Hamburg-like bird; the Barbezieux, something like a large Black Minorca; the Courtes-pattes, a dumpy fowl, with the shortest of legs, large black bodies, single combs: and the Mantes, which is like a

Houdan, with four toes and no crest. The French have several other breeds, but beyond the three described none have any special character.

Plymouth Rocks. This breed is perhaps equal to anything yet described as a farmer's fowl ; it is *par excellence* a fowl for all, possessing every qualification for profit. It is large, very hardy, tame, a fine layer of large yellow eggs, very plump and tender on the table ; it is precocious and a quick grower, and moreover a fine sitter and mother. The Plymouth Rock is a bird of American manufacture ; it has much Asiatic blood in its constitution, and as yet is not much known in England, although its value is appreciated by those who keep it. It has a single comb, clean yellow legs, a short tail like the Cochin, a large square deep body, red ears and face, and its plumage is cuckoo-like all over ; *i.e.* a light slaty ground, each feather crossed with two or more bands of a dark slate-colour. In breeding Plymouth Rocks, some chickens come white and others black, but this peculiarity is the same in all cuckoo-coloured varieties. The cocks weigh 9 to 10 lbs., and the hens seven to eight.

Dominiques, another American variety, are also very useful birds indeed, and resemble Plymouth Rocks closely. In plumage and leg they are identical, but the comb is rose, the tail full, and the shape more graceful and Hamburg-like than the Rock, which carries something of the massiveness of the Cochin in its build, with all the graceful curves of that variety.

As a profitable fowl the Dominique closely follows upon the heels of the Plymouth Rock.

The *Scotch Grey* is another cuckoo-coloured bird, which is greatly esteemed in Scotland, is not so large as the preceding, but its white legs cause it to be more esteemed for the table. In this and its comb, which is single, it differs from the Dominique, otherwise its appearance is the same. It is not quite so good a layer, but a capital mother, and an all-round good, useful, and profitable fowl.

Among fowls which need not be further referred to are *Silkies*, small black-skinned crested birds, with silky white plumage. *Frizzles*, or fowls with the feathers growing the wrong way. *Azeels*, or Indian Game, a sort of Bantam-Malay in appearance. *Dumpies*, short-legged birds of peculiar form, and *Bantams*. Among the latter are the four colours of Game, identical in all points with the game before described. *Black* Bantams, with white ears and rose combs. *White* Bantams, with the same points. *Japanese*, short-legged, large single-combed birds, with large erect tails. *Pekin* or Bantam Cochins, now very rare and valuable. *Cuckoo* Bantams, and the *laced* or Sebright Bantams. The latter are bred in silver and gold grounds, with every feather accurately laced round with black. They are marvels of breeding, and were first bred by the late Sir John Sebright, and latterly brought to great perfection by Mr. Matthew Leno, of Dunstable, a well-known pheasant breeder.

In describing the management of poultry, it will be well to begin with the egg, which will generally be found fertile when the hens have been running with a cock for ten days. Its fertility cannot be discovered until it has been sat upon for three to five days, when, being held before a strong light and shaded by the hand, a dark spot will be seen, in which the germs of the future chick can be traced. Some persons indeed profess to tell the fertility, and even the sex, of an egg, when it is laid, but it is needless to say that all such theories have been long exploded. Any difficulty in testing the egg will be overcome by comparing a new-laid egg with the one which has been sat upon, and when held before the light, the one will be clear, the other, if fertile, shaded, the dark spot increasing in size and density the longer it is sat upon, until in ten days the whole egg is dark, except a space at the top end, reserved for air, which enters the egg through the porous shell; thus an egg which has been greased, or the pores stopped in any way, will not hatch, but rather be preserved for household use. In setting eggs it is best to make a nest upon the ground, that damp may arise, moisture being necessary to successful hatching, for if the atmosphere is very dry and no moisture supplied, the membrane in which the chick is enveloped will become as parchment, and the little prisoner, unable to break through the envelope, to which it is in addition fast glued, will die before hatching. Where many chickens are raised

t is a good plan to build a row of wooden nest boxes 18 in. by 14 in. or thereabouts, without bottoms, the front ventilated and the tops with hinged lids. If these are about 14 in. deep, a turf may be laid on the bottom and covered with a nest made of straw cut in foot lengths. In these nests, hens which become 'broody' may be placed upon three china eggs, and when they have settled themselves down, the good eggs may be given them, having been previously marked in ink in the small end with the date and variety. This will enable the poultryman to tell at any time when they are due, and when they may be tested. A register should also be kept in a book showing the date when sat, the number of eggs given, the variety, the number of fertile eggs, and the number hatched. If each hen has a number in the register, and a chalk number on the nest box to correspond, so much the better. A register of this kind makes a man at all times master of his yard. In sitting hens, china eggs should be always used, otherwise the nest will be always foul from broken ones, and no eggs should be given to a hen until she has firmly fixed herself on her nest. The corners of the boxes should be well filled, or an egg may be rolled accidentally into one, and become cold and useless. If this row of boxes is placed in a room or outhouse, the attendant should take them all off by hand every morning, give them sufficient corn, grass, and water, and while they are feeding for ten minutes

examine the nests, removing broken eggs and washing soiled ones with sponge and warm water, after which the hens are caught up one by one, placed gently on the eggs and shut down. In this way fifty sitting hens can be attended to in fifteen minutes daily. It is a good plan to sit three or four hens at once, and when, on the fifth or sixth day, to make sure, the eggs are tested, and the clear or infertile ones removed, probably as many will have been rejected as will enable you to sit one of the hens again, or perhaps in unfortunate cases even two. It may be mentioned that these clear eggs are perfectly good for household use. On the twentieth day the eggs should be examined as usual at feeding time, and if nothing is heard within and it is very dry, it will be well to pour a little warm water round them, say a pint, when the hen is on. A steam will then be encouraged which will do more than anything to help the chicks out of the shell, and in all probability the next morning the little ones will all be seen dry and strong. If a chicken is confined to the shell little pieces should be removed with the idea of helping it out; should blood come, desist at once, get up a little more steam, and visit it again in six hours. In time, if not out, it may be removed entirely from the shell, but not while the slightest sign of blood is seen. On emerging it will be damp, but the warmth of the hen will dry it, and the down, which is encased in minute sheaths, will be freed, giving it the appearance so well known to all

who have seen a chicken. At the time of hatching, chickens take into the stomach a little bag of yolk left for their sustenance, and this helps them for the first twenty-four hours of life, during which they do not require food. The number of eggs given to a hen of course varies. At Christmas nine will be found sufficient for a Brahma, eleven in January, thirteen to fifteen in February; thirteen is the usual number, but many persons give large hens fifteen tc seventeen, some giving even as many as fifteen large duck eggs. Ill-formed and double-yolked eggs should be rejected, but should an egg be fractured during incubation, it may be mended by gumming several layers of tissue paper over the fracture, and it will then hatch. Hens are usually sat in all sorts of places, but it will be found the best plan to confine them. A wild hen will not at times take to any nest but her own; in that case leave her to it, and she will generally do well. Eggs should never be allowed to get chilled when sat upon; an hour in March will often spoil a whole sitting where the hen has only been upon them a day or two, or where her time is nearly up. They withstand exposure better when at half-time, but very little longer even then. At the end of the twenty-first day unhatched eggs, if quiet, may be shaken, and if they 'flop' they are addled, and should be thrown away unbroken, as they are putrid and smell very strong. Eggs will travel long distances, and then hatch as perfectly as when sat at

home if they are well packed. Small baskets or boxes are best, each egg being first wrapped in thick newspaper, and the ends squared to resist concussion; if then bound in hay and laid in chaff which covers them an inch each way, they will do very well, a label being affixed outside intimating that care must be taken of the package.

When the new chicks are strong they should be removed with the hen into a coop placed on a dry path or grassplot, facing the sun; or in early spring under a shed, or on some dry warm spot where there are no vermin, rats being determined enemies of young chickens. The first feed should be given to the hen, and when she is satisfied, her little ones may have some chopped egg and bread crumbs, which may be given for a day or two, and varied with boiled rice, raw rice, groats, hominy pudding, scraps, &c. To these foods may succeed wheat, and buckwheat, which should become the staple grain, until they are able to swallow small maize, which they like very much; barley meal and oatmeal constituting the soft foods. The coops should always be upon a dry soil and removed every few days; if this cannot be, let it have a bottom, but in this case it must be kept very clean, being daily strewn with sand or dry earth. Any kind of coop will do which keeps out the rain and wind, and protects them at night from prowlers. Sand is good for the coops, as it can be kept sweet by raking, and bricks placed round the coops at night

keep rats out. As the chickens grow they will need change, and in six or eight weeks the mothers will leave them and begin to lay again. They may now be separated into companies, and given a house and perches to themselves. The feeding should continue to be liberal, plenty of wheat, maize, and meal given them; the latter, if mixed in liquor in which greaves have been boiled now and then, will help them considerably. Bullock's tripe, sheep's paunch, and runners, cleaned and boiled, are the best animal foods, and are very cheap in most places; the chief difficulty is in cleaning and cooking them. Some persons do not like giving water to chickens, and we confess that if they are at liberty, can get green food and are fed upon soft food, they do not want it. We have seen many cases of chicken cholera or diarrhœa where it has been given, more where it has not, and this complaint, when it attacks, is usually fatal to numbers of youngsters. With regard to artificial foods, we know of nothing so good as Spratt's; we have used it with great success, and consider it the best food of any kind, as indeed it ought to be at the price. As the young birds grow older, they will need less constant feeding, and it is a good plan when they are about three months to separate the cockerels from the pullets, or the latter will not get their fair share of food. Good early morning feeding, twice during the day, and then a feed last thing, will be ample; a dry roost is then all they want to complete their requirements. Food

should not be left about, enough only being given at each feed. In most breeds the chickens will be ready for market at eighteen weeks, and for sale alive for other purposes at five and a half to six months. Those intended for stock should early be transferred to the runs on which they will have to remain, and the pullets will usually lay at six to eight months, unless they are hatched after March, when they may have to contend against the winter, and so not lay before spring; it is therefore best to hatch for stock in January and February, when they will lay about September or October, sometimes indeed earlier.

We may now refer to the houses used for poultry, and in the first place it may be remarked that fancy buildings should form no part of the yard of a person breeding for profit. Where there are farm buildings of any kind there is almost sure to be a poultry house and the larger it is the better; the bottom should consist of dry rubbish, which will enable the birds to bathe or dust themselves, and on this a little sulphur and lime may be sprinkled with effect to kill the insects which infest all hen-roosts. It is needless to say the house must be dry and warm, yet well ventilated. It should be cleaned out at the very least once a week, and the manure will about pay for the labour expended upon it, this fertiliser being worth about 1*s.* per cwt. The nest boxes should be sufficiently numerous, built with a sloping roof, so that the birds will not roost upon and make them filthy

and they should be arranged so that the lime brush can reach every crack in which insects hide. The lime brush should never be spared, or the birds will not only be covered, but every person who goes into the house will find himself attacked by these pests. The straw in the nests should always be clean, and if the insects are very numerous the hens should be caught and a little paraffin rubbed in the feathers under the wings and thighs; a little sulphur dusted among the feathers is also a good remedy. The perches in the house should be built ladder fashion if the hens are active and light, but the heavy breeds had better have low perches not more than two feet in height, made out of a length of pine or spruce sawn down the middle, the round rough side being placed uppermost. There should be a trapdoor to admit the birds, and a stout door for the attendant always kept under lock and key. It is always well to have one or two moveable houses for placing in the various fields, moving them at night time. These houses may be made by any village carpenter at a cheap rate if an idea is given him of the dimensions. One plan of a plain house is as follows: height to eaves 5 feet, width 4½ feet, depth 5½ feet. The house is made with a ridge lapping well over. A strong but fine framework is covered with either matchboard seasoned, feather-edge board, or galvanised plain or corrugated iron; the latter will be found the cheapest and best. Perches may be fitted across capable of

receiving thirty to forty hens, and nest boxes can be fitted along the side. The door should be fitted with a window covered with wire netting, and at the bottom a trap which will require closing every night. No floor will be needed, and the house can either be built upon four wheels or fitted with stout handles at the corners, that it may be carried. Another good house may be made of an old waggon, or built upon four cart wheels, the sides composed of straw, fern, or furze, built upon a framework of ash-poles, and the top a similar framework thatched. We have seen a house of this kind drawn about a gentleman's park, and it answered admirably, roosting one hundred fowls comfortably enough. It is a great point to keep the birds in companies on different parts of the land and a good distance from each other, as they are much more productive and less liable to disease. There never need be any drinking appliance in such cases, as unless the season and the soil is very dry, they will always find sufficient moisture in the green food they eat and the water they can nearly always reach. Hens should never be confined, and although they may be kept in good health and lay well under such circumstances, the conditions are not suitable for a large poultry yard. If it is necessary to keep any number of male birds, this can be easily done, as they bear confinement well and indeed improve by it. For this purpose a little house or coop about 2½ feet square is necessary; it should be provided with a

perch and a drinking tin, a door at the back and a trap in front to let him out into his run. This run need not be any more than four to five feet long, and if the sides and end are made of wood and the top of wire, he will do very well.

Among all poultry will at times be found birds which are addicted to some kind of vice. If any suspicion arises that any of the hens eat their eggs, let them be tried and watched; a newlaid egg being placed in their way will quickly discover the faulty ones, and then in the case of common poultry our advice is, get rid of them at once. If it is decided to correct and keep the culprit, she should be removed to a confined place, where the nest has a false bottom, so that when laid the egg rolls down through a hole into the space left for it beneath. Some persons fill blown eggs with all sorts of horrible messes, but these rarely succeed. It is always a good plan in a poultry yard to keep two or three cats which have been reared among the chickens, in which case rats will be kept down and many chickens saved.

A few words only are needed with regard to the diseases of poultry. Roup is the chief plague, and is usually brought on by neglected catarrh combined with filth, bad feeding and ventilation. The bird runs at the eyes and nostrils at first, then the face swells and a fetid secretion appears, the poor thing rapidly losing flesh and refusing to feed. There is little to be done after roup has attained a fair hold of a fowl, but in its

early stages it may generally be cured if removed to a dry pen and the bird well fed on bread and milk, and cod liver oil given three or four times a day in its capsuled form. The great thing is to keep up the strength until the disease takes its turn and the bird is able to throw it off; to this end the face and nostrils should be kept free of matter and pus by the use of chlorinated soda, which if necessary may be injected into the nostril. Raw egg is another admirable food, also Parish's chemical food. Copaiba capsules sometimes assist in effecting a cure. *Cold* or *catarrh* needs treating at once or it may degenerate into roup; high feeding and warmth do more than anything.

If a fowl is *cropbound*, the food being coagulated in a hard mass, it should be at once put in a basket or cage where it can get nothing but what is given it. Here feed on beer and bread sopped, and if in a couple of days no improvement has taken place, a slit should be made in the top of the crop some inch in length, cutting downwards: a hooked knitting needle may be introduced, and the mass taken out piece by piece. It will usually be found to be composed of hay, grass, straw, &c. When empty, some warm water should be injected to cleanse the crop, and the bird allowed to have nothing but thin sopped bread and milk for some days, when if strong and well it may be returned to the fowl house. The wound will heal of

itself unless too large, when it may be sewn up, the crop first and then the outside skin.

Diarrhœa is a complaint which quickly kills poultry. Directly a bird mopes this may be suspected. At once give a little castor oil, and in a few hours feed upon raw egg, boiled rice, &c., giving a little brandy if the bird is very weak. If this has no effect, mix prepared chalk with the food, and feed little and often. Anything that experience suggests may be given in a severe case, other remedies failing to stop the purging and keep up the strength.

Paralysis may usually be cured by doses of homœopathic strychnia (*poison*) NI—200, two or three drops in a dessert spoonful of cold water given three times a day; the feeding being nourishing and digestible.

Elephantiasis is a parasitic growth upon the legs. It is unsightly and contagious, but may be easily cured with sulphur made into an ointment mixed with lard. A few dressings only will be necessary.

In some parts *Gapes* carry off many chickens. The little ones will be continually found opening their mouths as though something was in the throat. It is in reality a worm which lodges itself in the windpipe. If the chicks are large enough, a feather which has been dipped in dilute carbolic acid, one to sixty, may be passed down and the worm dislodged. Where gapes are prevalent, all new chicks should have their heads anointed with an ointment composed of

sulphur and petroleum each one part, lard and mercurial ointment each two parts. Sometimes the comb and face will assume a white abnormal appearance from the presence of a parasite. A few applications of dilute carbolic acid will cure it.

Ducks. Probably no portion of the yard is so manageable and so profitable as this. Good ducks lay well, breed well, and give little trouble. The best varieties are the *Pekin*, a large white breed weighing from 7 to 10 lbs., with yellow bills and entirely white plumage; the *Aylesbury*, a smaller bird, of white plumage and flesh-coloured bill; and the *Rouen*, a large bird marked identically like the common wild duck. The Pekin lays the largest egg, a white one, and it is the hardiest and most fertile. Where ducks have a pond, or stream, and a good run, they do very well. They should be shut in at sunset and never let out before nine or ten o'clock in the day, as, if let out before, they are apt to lay away, as they seldom or never lay after that time. We have kept all the varieties, but never knew the Pekin to sit, although the other breeds do so; but it is a better plan to hatch the young under hens, feeding them when first hatched on boiled rice, which should be frequently given, for the first week. Young ducks are very liable to diarrhœa, which carries off more than anything else; this aside, they thrive very well; they eat anything and grow very fast, being often ready for table at eight weeks old. A little wheat is the best hard food they

can have, but we prefer meal-greaves and sheep's-runners to fatten them quickly. Some persons allow them to go to water for a daily swim, but we believe they grow faster without it, a bowl of water for drinking being all they need. They are like pigs and will eat a great deal, liberal feeding paying best in the end.

Ducks take a month to hatch (twenty-eight days), and are usually much stronger on hatching than chickens, and the Pekin is far more fertile, thirteen and fourteen at a time being common. Although ducks lay and fatten well without water; they will not breed without they can have a daily swim. They are fine foragers, eating all sorts of green food and quickly cleansing a garden of slugs and worms. They commence laying about the end of January or February, and lay 60 to 80 eggs, sometimes considerably more, before moulting, the eggs being saleable at all times at good prices. It is usual with some persons to keep a drake to every three or four ducks, but one to every ten is quite sufficient. The drake is known in the white breeds by the curl in his tail and his softer and more subdued voice than the duck. In the Rouen breed the drake assumes female plumage in the summer. Ducks pay the breeder well, especially as he can get them off-hand in eight weeks at remunerative prices.

Geese.—The chief breeds are *Toulouse*, the grey variety, and Embden, the white. Geese live and

breed a great many years, and wherever a little grass land can be had they can be raised with profit. They generally lay one sitting of eggs, which should be placed under common hens, hatching in thirty days. Geese never lay until the spring, and for breeding purposes should never be allowed to become too fat. The varieties named often reach 24 lbs. weight the first year, and as much as 30 lbs. as adults; but for market purposes several pounds under these weights are very fine, and can be attained with good stock without much difficulty.

Young goslings need similar feeding to that described for ducklings, but in addition it should be well mixed with green food, chopped grass, onions, and lettuces; and when fairly set going they will wander about with the old ones, grazing all the day and needing nothing more than a morning and evening feed of corn or barley meal. They fatten readily when shut up, the best food being oatmeal, barley meal, and oats, and maize in water. Four geese only should be given to each gander, each goose laying thirteen to fifteen eggs. Old birds do very well on what they can find from April to October, but should be fed twice a day during winter. Goslings can be purchased in most parts at from 2*s.* 6*d.* to 3*s.* each at a good age, and if turned on to good grass and finally on the stubbles, they get fat by October and readily command good prices.

Guinea fowls are not so profitable as the other

varieties of poultry, as they are troublesome, quarrelsome, and wander far from home, laying many of their eggs away. They are, however, valued on the table and sell well. If it is intended to keep them, the best plan is to purchase eggs and so attach the young to their home, as purchase birds are often lost. The eggs are always in demand, and with thoroughly tamed birds are usually laid at home, the hens laying about eighty eggs of rich flavour and a dark colour. The eggs are usually sat under hens, as the Guinea hen seldom sits till late in the summer, and they take twenty-six days to hatch; the chicks are not so hardy as ordinary poultry and require feeding oftener, but with ordinary care they do very well on the usual chicken food. In some parts a cock is allowed to each couple of hens, but at least four may be allowed with safety. The cock is a spiteful bird, and may be distinguished only by his attention in calling and playing up to the hens.

Turkeys are not so largely bred in England as they should be, and it is a disgrace to our farmers that so many are imported for our consumption. Although some trouble to rear, the sale of a flock of well-bred turkeys each Christmas would realise sufficient to pay a good many rents. The chief varieties of pure-bred turkeys are the Cambridge, which are bronze, reaching 28 to 35 lbs. in the cocks, and 12 to 14 lbs. less in the hens; the Norfolk, a smaller and black variety; and the American, the finest known breed, which has

of late been much crossed with the Cambridge. In commencing to breed it is a good plan to purchase a large-framed young cock, stout and short in the leg and level in the breast. He may be mated to from eight to ten hens, which will each lay from eleven to sixteen eggs between March and April, but if they are very large it is not advisable to let them sit, or they will break some of the eggs from sheer weight. The hen sits from twenty-eight to thirty days, selecting her own nest, upon which she should never be disturbed. When hatched and strong, the hen and her young should be cooped upon a dry warm spot and well fed, after which her little ones may have their first meal of chopped egg and oatmeal or bread; this may be continued for a few days, when the meal may be given alone, bread sopped in beer, chopped onions and nettles, boiled rice, curd, wheat, malt, and so on. Young turkeys want much care; damp does not suit them, nor cold winds; but with warmth and good feeding they do very well, and soon grow large enough to take care of themselves. When weight is required the bird's exercise should be limited, and as much food given as it will eat; this should consist of oatmeal mixed with suet and milk. It should be remembered in breeding for sale that the larger the turkey the more he makes per pound.

Artificial Hatching.—Some persons are in the habit of hatching all their domestic poultry in an incubator, but although the system answers very well

with some machines and in some hands, yet it is not sufficiently perfected to enable us to recommend its adoption where profit is concerned. Machines are in the first place expensive, in the second troublesome and not at all certain, and in the third place the chickens when hatched require the aid of further artificial means in the shape of a hot-water machine or mother, to keep them alive and strong. Christy's hydro-incubator is so far the best as it is the most successful that has been produced, and without doubt will answer well, but it must have minute attention the whole time it is working, and it demands constant thought, as the varied temperature constantly affects its working effectually. It is simple in the extreme: a large square boiler is filled with boiling water, the eggs are placed in a drawer below, which is ventilated and steamed, and so arranged that the temperature shall remain at 104°, the required heat. To keep this heat up, boiling water is added two or three times a day in quantities according to the temperature of the apartment. The 'Howell' machine is similar in its application and also works effectually.

CHAPTER VIII.

THE POULTRY FARM.

Arrangement—Stock—Management.

THIS subject has been of late years a theme of much discussion, yet it has, nevertheless, received little real treatment at the hands of those who are best able to advise, and less at the hands of those able to undertake or establish and carry on the business. The consequence is that letters are periodically written by persons who conceive great results from such a business, and who ask innumerable questions, the majority of which are too absurd to particularise, or even to answer. That, however, a poultry farm is not an impossibility, we are aware, but that it could possibly be made to pay high profits, or even become a very extensive concern, we deny. The most one can hope for is by good management, good judgment, and economy, to see such a business paying a fair business profit. Visions which, with some people, are very frequent, of a hen laying 200 eggs a year at 1½*d.* each and returning 25*s.* to the exchequer in the gross, are all absurd, for, by this reasoning, it is argued that it only requires

1,000 hens to return 1,250*l.*, resulting, after deducting 250*l.* for expenses, in a handsome profit on eggs alone, without counting chickens, manure, feathers, and fancy prices. Anyone starting a poultry farm has to reckon on no probability of this kind, but to consider stern facts, and on the other hand probabilities of loss. Putting fancy poultry aside, profit, or rather high prices, must be problematical, but disaster much more certain. In other words there is a line as to price which cannot be overrun, for the public, taking the year round, would not pay 1½*d.* each for eggs, whilst disease and other forms of loss are certain to come sometimes. Cold, wet, and a hundred causes are at work annoying birds at all times. It will be asked, if poultry farming can be made to pay a business profit, how is it to be done? In answer to that, we will endeavour to show how. One thing must, however, always be borne in mind, that fowls, like everything else, require to be understood. It is not the man who has been disappointed in a London office or shop, and who has, perhaps, kept half-a-dozen hens in his suburban yard, who should start a poultry farm. Nor is it the peasant farmer who from youth upwards has been engaged in various ways upon his land or among his pigs. A successful poultry farmer would need some of the qualifications of each individual, together with an amount of patience and perseverance altogether foreign to such men. One individual has been accustomed to certain hours beyond which he cannot

work, the other to a certain routine of life which has cramped his understanding and unfitted him to engage in anything which is open to competition and shrewdness. Again, a man taking a poultry farm ought to thoroughly understand the various breeds, and how to cross them to some purpose. He should understand and know how to combat disease; be a ready hand with tools, able to plan and execute his own work. He should have some knowledge of grain—a very essential thing. The properties of food are an important element in the economy of a yard, and where one man will feed upon boiled turnips, and expect his fowls to lay, another, who knows that nitrogen cannot be got from carbon, will, though poorer in pocket, buy wheat. In fact, without further remarking upon a man's qualification, it may be added that he should be master of every branch of the subject in the same way that a tradesman is supposed to be who has served an apprenticeship. Suppose that the right man has 500*l.* and determines to start a farm: his first move would be in the direction of land—a suitable spot. We should not advise him to select clay on any account; it is the worst possible; nor should we, on the other hand, direct him to a barren soil like the district round Woking and many other places where little grows beyond heath. We mention this because we have often seen such farms or plots of the same advertised at tempting prices. Rent may be an object, but it is as true now as it used to be that bad land is dear at any

price, whereas good land will always pay. We cannot, of course, be supposed to point to a spot suitable for a farm, but we do say this: that it should be rich light land on which water never lies, and which, except in very dry seasons, produces heavy crops whether of grass or roots and corn. Such land can be had at from 40*s.* to 50*s.* an acre, and, in some instances, it is furnished with a residence and buildings. At any rate we would advise no one to start his business on any but a suitable spot, for he would be simply courting failure. He wants good land and suitable buildings; he must be tolerably near a station, and not too far from London. Patience and perseverance would not be wasted if a whole year were occupied in the search; but disaster would come sooner or later if the farm were unsuitable or inconveniently situated. We must, then, suppose the farm to be taken an accomplished fact, and that the plan of operation has been decided upon something after the following, the acreage being estimated at 30 to 40, of which 10 to 15 is arable, the season Michaelmas:—

Number of hens determined to start with	500
Divided as follows: Leghorns	100
Black Hamburgs	100
Minorcas	100
Brahmas	50
Brahma-Dorkings	50
Houdans	50
Ducks (Pekin)	50

To the above should be added three male birds to

every fifty females, except in the case of the Brahma Dorkings, which need not be bred from. The whole of these birds should be early pullets, but no objection could be taken to the selection of 20 per cent. of young hens which should be marked with a ring in the leg, and then used for stock or the breeding pen—hens throwing stronger chickens than pullets. The same effect is not produced so readily where pullets are used mated to an old cock, because, as a general rule, none but cockerels are vigorous at Christmas, when the pens of the large breeds need to be mated up. If care and judgment are displayed in the selection of the stock, they will all soon be in full lay, and lay throughout the winter. By Christmas, eggs of the Brahma and Houdan breed should be sat, and Leghorns about the end of January, Minorcas following in February and Hamburgs early in March, together with ducks, which, indeed, might have been commenced in February. It is only by such means, and carrying them out in a determined and persevering spirit, that early pullets can be obtained, which will begin to lay in many cases by August, continuing with but little intermission until the following spring.

Having got as far as the varieties which would be required on the farm, with the numbers advised for each, we said that with care and judgment in feeding the early pullets would soon be in full lay, and would lay throughout the winter. We are no advocate for warming the houses by artificial means, but we must

nevertheless impress upon all the necessity of warm houses, and, above everything, perfectly dry ones, free from draught. The Asiatic breeds, if hatched in January and February, generally begin to lay in the autumn and on their own runs; fed well, they lay well right through the winter; if changed to another run, however, we have often known them to stop, and for a long time. By the same rule we have known birds which ought to have laid, and did not, to have commenced laying when removed to another yard. Hamburgs, Leghorns, Houdans, and Minorcas want hatching by the middle of March; they will also lay by the autumn. There is no rule, of course, because a bad season will tell on them as on everything else, and where a whole flock will lay daily almost in a mild autumn and winter, only about 5 per cent., or perhaps less, do so in more severe weather. No one can commence a farm and at once find things *couleur de rose.* The first season must result in more or less disappointment. Birds that are bought may prove most satisfactory, in which case the buyer gets no more than he expected; and, on the other hand, others, and perhaps quite as many, may prove unsatisfactory, whereby he gets more than he bargained for—or less, and disappointment. It is usually impossible to obtain the same results from stock casually purchased as from stock bred at home, used to the place, the feeding and the conditions of living, or as from the same varieties carefully bred from fine

parents, inured to the soil, and kept through the year under the most favourable conditions; hence he who adopts the first mode of starting his farm must be prepared for annoyance and trouble such as none but a practical man can combat. It were somewhat difficult to guide an untutored individual into the mode of purchasing, and in no way can it be shown more clearly how very necessary it is that incompetent men should steer clear of a poultry farm. The very beginning puts them to the test, and if they find it necessary to call in aid, or to doubt their capacity to purchase their first stock, let them give it up at once. Birds bought early in September should look red about the head, be nearly mature in growth, and be almost free of new feathers, unless, being very early, they are in moult, as many January and February birds are at this time or a little later. There should be no lack of plumpness, no ailment such as cold or diarrhœa, and when buying, it should be asked how they were fed. Young birds which have been used to certain foods do not touch those grains which are strange to them, and often lose condition in consequence. Houdans should be red and swollen, or 'sprung' in the comb and wattles. Hamburgs should have put on the red in face, comb, and wattle, and the ears should be grown to their normal size. Ducks should have moulted their last feathers, and look fully matured; the voice will guide the sex best, the drake having a soft low voice, the duck a

loud quack. Drakes also have a curled tail feather which denotes the sex, but the unwary do not always find it. Having got the stock together, there is no harm in their mixing, not even with the strange cocks, providing all eggs set are from birds which have been apart for at least a fortnight. At all events, during autumn and winter it is quite as simple and much less trouble, and it conduces to health, to let the birds mix in parties—not too many—but free from constraint and runs. A little trouble will make the cocks good friends, and during moult they seldom fight. However, in commencing, it would be quite as well during the time before the hens require mating to do without cocks at all, and not purchase them until they are actually wanted, when probably their houses and runs will be ready. With regard to feeding something must be said; and in buying go to the best market and buy a quantity. As a sound staple food nothing is better than maize: it is handy, cheap, and proves an admirable food for all kinds of young poultry, but it is not so well for old birds. At some seasons it can be bought very low, and then is the time to lay in a store. Buckwheat again is very cheap and should be largely used; we would place it next to maize, and if bought by the ton it can be obtained from Havre as low as, say, 24*s.* per quarter. Wheat is, of course, good, but unless it can be purchased in the shape of tailings from a neighbouring farmer, it should not be thought of. Barley the

same ; English samples are too expensive, and foreign is bad. Oats are useful for ducks, but not for poultry except when ground. We would, therefore, rely on maize, buckwheat, whole and ground, and vary the diet with barley meal and toppings, or fine sharps mixed. Next we would say, on such a scale as this, grind your own corn. You then know the quality, and obtain a better and larger sample. Lloyd's mills answer admirably, and there is nothing better for feeding than maize meal and buckwheat meal mixed. Until, say, October the birds should be fed thrice daily—say, from 6 to 7 A.M., at 12, and again the last thing. We do not in this case advocate any special method of feeding, and whether on hard or soft food at night, but hard food should be given twice a day at any rate. If the birds are all at liberty and within range of grass and water, there need be no water cans, and of course that saves time. One thousand birds will need in food at least one sack of grain, whole or ground, daily, which is about a gill per bird, or 1½*d.* per week, the same, within a fraction, of what each bird will cost, more or less; and it will be found poor economy to give less, or to feed upon anything such as vegetable food (roots, &c.) A change may be given now and then in the form of flesh, and, when it can be purchased at a cheap rate, horseflesh will do for the purpose; this should be boiled in a copper, and the liquid used for mixing with the barley or buckwheat meal, and served hot.

Where so much depends upon health it is a good plan to periodically mix a quantity of sulphur with the meal; it will do the birds a great deal of good, and may be the means of staving off sickness in many. Among a thousand this may be at any time looked for. We shall have to consider next how to house the whole stock and provide them with separate runs, but before doing so we cannot do better than quote a few very sensible remarks on the subject from a Transatlantic newspaper, the 'American Agriculturist':—

'No other business connected with agricultural pursuits seems so attractive as poultry farming. Even those who fail in the business and retire from it, aver that they are certain they could succeed in a new trial, their mistakes having taught them how to succeed in future. This may be true, but it is noteworthy that they do not try again. Still we have almost daily inquiries, especially from young men, as to the possibility of making a living from poultry, to all of which we are forced to give unsatisfactory replies. The profit in poultry lies in keeping small flocks. From such it is easy to make an income of one dollar from each hen annually, even after buying food. But no account must be taken of the waste and damage done to crops, nor of the value of the free foraging done by the fowls; and these amount to a considerable sum if figured up closely. Then accidents are to be taken account of. For instance,

the writer once kept a flock of thirty light Brahma hens, which did well for three years, and paid excellently; but the unfortunate introduction of a cockerel from a distant yard brought a prevalent disease, of which every bird died, leaving one brood of motherless chicks the sole survivors. This may be taken as an example of the uncertainties of the business, which are increased in proportion as the flock is larger. A flock may be kept as an adjunct to a more important business, and to take up spare time, and in that case, barring accident, may be made profitable. But it may be taken as a certainty that not more than one person in a hundred who have tried it, has ever succeeded in keeping a flock of several hundred fowls in profitable condition. If one thinks he is born to succeed, let him try; he may possibly become a shining example to show others the way to success.'

The next point is to provide houses and roosts for the stock and to mate them up. As there are 500 birds to be kept upon 30 to 40 acres, for eggs and breeding, some of which must consequently be separate, we advise that two large houses be built to hold each 100 birds, thus providing for the Leghorns and Hamburgs. These houses should be placed at the greatest possible distance from each other, the two varieties being so agile and active that all chance of their mixing should be diminished. If one or both can be made in a lean-to fashion so much the better,

if not they should be built about 6 ft. high at the eaves, and, say, 15 ft. long by 7 ft. broad, with perches in the step fashion. Any handy man can construct such a house, and the best and simplest way is to build a stout frame, and instead of finishing with deal boards, to close it with corrugated galvanised iron, which can now be bought very cheaply.

It is as true of fowl houses as of others, that scamped work is far the dearest. Wood is always troublesome, it varies with the weather, and, under the best conditions, is never of much good for permanent houses. Iron admits of no wet and no draught, and it is, moreover, thief proof and vermin proof. The man who starts with strong iron houses has a great advantage in his favour. For summer ventilation a small space should be left under the eaves, but no perch should be placed on this level. For winter it can be closed up with anything that may suggest itself. A row of nests, about a dozen, should be built along the side of the house, and if these can be of iron also, so much the better for the hens and the worse for the vermin, which will not be able to find a resting place in the building. If the house is to be permanent, we should advise that the floor be dug out a foot, a layer of iron or fine wire netting spread well over the bottom, a good layer of broken brick, stone, glass, &c., first being rammed in; a layer of cinders or sand over the netting, and concrete on the top. The manure will thus be easily

swept away, and the place be always clean. A small trapdoor should be made to enable the birds to obtain ingress and egress, and with a window or sliding trap in the door or side opposite the nests, to give light and air, the house will be complete. Two such houses will provide for 200 of the hens and necessary cocks, and admit of the former having full liberty. With regard to the 100 Minorcas, a house of similar dimensions must be built if there are no other buildings, but if, as is certain to be the case, there are some buildings, then such must be made available. Wherever there are farm buildings there are generally three sides of a square, hence we should take advantage of each. Let the Minorcas be provided on one side, the Houdans on the other, and the middle side or end be made suitable for the Brahmas; a high rail or wire fence must be used to prevent the birds mixing during the breeding season, and some means must be taken to prevent the various cocks fighting through the railing. We have seen a similar place to this where there was free range all round and the birds evinced no desire to fly over the railings, but went their way in the right direction. If, however, there is any difficulty about it, the fifty Brahmas can be provided for elsewhere, for, not being flyers, they are easily kept in bounds. Again, the Brahma Dorkings may, if they are a good cross and lay coloured eggs, be divided amongst the Minorcas and Houdans, because the colour of their eggs will prevent their being used

for sitting. Wherever the houses are situated the same precautions should be taken to guard against vermin and the elements. We have thus disposed of the poultry. The ducks must of necessity have, first of all, water; for, although they can be kept as layers without it, or with no more than a tub, yet, where they are so bred and kept in numbers, a pond of some sort must be had. The house may be situated anywhere, so long as it answers all requirements, having air, warmth, and so on. As ducks roost on the ground, they should always have some dry litter on the floor of their house, and for this purpose straw is generally used, though where this has to be purchased, it soon becomes an item of expense; hence we advise duck-keepers to rake up all their leaves in the autumn and store them for use. Dry leaves are a capital litter, but they must be dry. It must be remembered that as ducks lay in the morning early, they should always be got in at night and shut in until about nine or ten o'clock, or the eggs may probably be laid away.

CHAPTER IX.

PIGEONS.

How to begin—Varieties—Feeders—Requisites in the loft—The eggs—Breeding—Feeding—Young pigeons—The sexes—Mating—Parasites—The loft—Breeds described—Homing pigeons—Diseases.

THERE are few country houses where these pets are not found. Some persons keep them irrespective of breed, solely for table purposes, allowing them to have their entire liberty, with a rough cote in which to lay their eggs and rear their young. To persons who simply desire to do this, few instructions are needed: but we may remark that, although pigeons of this character will be found to produce a great number of young every season, they cannot compare in their profitable nature with others of a higher type. Common pigeons at liberty cost nothing, and a dozen couples would probably rear 70 to 80 young ones, of the value of 60*s.* to 70*s.* In starting to keep them, the best plan is to purchase young ones which are just feathered and able to fly, and which have not had their liberty. These may be put into the cote, which may be covered with wire to prevent their escape; here they should

be kept for a few days, being supplied with food and water; then the wire may be removed and in all probability they will have become used to their new home and will remain in it. It should be regularly examined and cleaned out, and it must be ascertained whether rats visit it, or when the young are hatched they may be taken away by these marauders, which are especially fond of a pigeon loft.

Should it be deemed advisable to start a pure race of pigeons, a variety which may be bred for sale, then every opportunity should be taken of studying the various varieties during the time the loft is being fitted, and a few pairs of Dragons or Antwerps are showing you the little ins and outs of pigeon breeding. There are a large number of varieties of the pigeon, and in this work we can do no more than glance at a few of the most profitable, reserving our few remarks for the more practical lesson of breeding and management. The principal pigeon recognised among fanciers is the Carrier; the name is inappropriate, but as it is a long-established one it cannot be altered. The Carrier does not carry messages, indeed it is so valuable that many fear to fly it outside their lofts. It is bred for show purposes only—the length and fineness of neck and feather, length of beak, narrowness of skull, and quantity of the fleshy substance termed 'wattle' surrounding the eyes and carried on the beak, this wattle being at the same time symmetrically built on. The real carrier pigeon is called

in England the 'Homer' or 'Homing Antwerp,' and is a blue, red, or dun colour; it is however of incomparably less value than the Carrier, specimens of which have been sold to acquaintances of the writer's at 100*l.* each. This pigeon pays well to breed, provided the stock is of first-rate quality; and indeed it may at once be remarked that badly bred pigeons of any kind will not find a sale at much more than a few shillings a pair, whereas well-bred ones always command good prices. The carrier is a bird which demands a deal of study, and no individual should purchase expensive specimens unless he has tolerably well mastered the breed or is assisted with the best advice. Should it be determined to breed this variety, or Barbs, Tumblers, or Pouters, then it will be necessary to start with a few pairs of the before-mentioned common Antwerps or Dragons, which will be needed as nurses or feeders. These may have a loft to themselves, divided from the best birds, with a door to admit them out of the air whenever it is needed. If they have their liberty, they will find food of a wider description, and feed their young much better, rearing more, and those stronger, than if they were nursed by pigeons entirely confined. Any place almost will do for their loft, provided it is dry, warm, and entirely proof against rats and mice, as the former will kill pigeons young or old if they can reach them, and the latter not only eat the food but disturb the sitters, making them leave their eggs and often forsake their young, besides

which they prepare the way for rats. There need be no appliances beyond a water fountain, a food box, and the requisite number of nest boxes, which may be hung along the wall, no elaborate arrangement being necessary. The best nest box is made from a grocer's box about 2 ft. long by 1 ft. wide and 1 ft. deep. The lid is not wanted; a partition is fixed in the middle, it is hung on to the wall, the bottom of the box now forming its back, an earthenware nest pan is put into each compartment with a little sawdust in it, a small strip of wood is nailed on the bottom to keep the pans in their place, and the nests are made. Each box does for one pair, and with two pans they can lay again in one whilst their young are still in the other. The system adopted in rearing the eggs of the best birds under these feeders is as follows. A strict watch is kept upon the breeding birds in the closed loft, and as each egg is laid it is marked with the name and date and put away in sawdust, a dummy egg being put in the place of the first, to induce the hen to lay the second egg. When both eggs are laid the dummy is removed, and the second one marked and put with the first. A watch has meantime been kept upon the common feeders, and when one of the hens has laid her second egg, the marked pair of eggs are given to her to sit upon, and her own taken away. She thus unconsciously becomes a foster mother, hatches and rears young which are not her own. Care must always be taken not to expose the eggs which

are to be kept to any shaking or to too much air; in any case they will not hatch with certainty if kept many days, so that the sooner they are given to a feeder to sit upon the better. Another thing must be remembered; pigeons sit but 18 days, at the end of which time the soft food comes ready for them to feed the young with. Therefore if new eggs are given to a pair of pigeons which have already been sitting a day or two, time and eggs will both be wasted, as the birds will forsake them to a certainty if they do not hatch when *they* have sat full time. We have certainly been able to hatch young from eggs given to a pair of pigeons which have been sitting for 24 hours, but this is risky, and should only be attempted in extreme cases. The soft food is the grain which the pigeons have eaten, which is formed into a kind of pulp, and which is vomited into the beak of the young pigeon, or, as they are termed until they get their feathers, 'squabs.' On this pulp they grow rapidly, and as they grow it becomes more solid day by day until at last the whole grain or pulp is given them, after which they soon learn to feed themselves. Squabs, and squeakers as they are called, when feathered and able to run about after their parents, calling or squeaking for food, should always have their crops full of food, and some fanciers who have not the aid of feeders daily examine them, and if they have not full crops, themselves chew some peas or beans and feed the young ones from their own mouths.

This plan succeeds in saving and rearing many valuable young birds. Both pigeons sit upon the eggs, the cock from about 11 till 4, and the hen the rest of the time. The cock may be told as a rule by his more masculine appearance, and in the breeding season by his playing up and strutting after the hens, spreading his tail and cooing in an unmistakable manner. If any doubt is felt about the sex, a hen should be put alone with the strange bird and watched; if a cock he will soon be found to play up to her, if a hen, perfect quiet or a fight may ensue; in that case take the hen away, and introduce a strange cock and watch again. In the winter time it is very difficult at times to discern the sex, cock pigeons being often callous and unwilling to display; then mistakes often occur and sales are made in error. The only plan to adopt is to watch carefully, and with a strange bird watch until you find out the real state of the case. When it is desired to mate two particular birds, and in breeding fine pigeons this is necessary, they should be first put in separate cages with a wire between; in a day or two put them together, and if they are uninterrupted by other unmated pigeons they will surely match, and the cock will be found frequently driving the hen about the loft until she lays. The manure in the loft should be frequently removed and sawdust strewn about, and the nest pans, which will soon become foul with the young squabs, should be regularly cleaned and sawdust strewn in. For food we advise a mixture of

small maize, old tares, old tick beans, and old grey peas. New food should never on any account be given; it scours, and rapidly kills pigeons. A little hempseed or rape may be given now and then; it is stimulating and much relished by pigeons, who will always come for it. We do not like leaving the food in an open box; a hopper which is self-closing should be used, or what is better, we like hand-feeding twice daily, that nothing is left to induce vermin to take up an abode. The water should be very clean and regularly changed. Besides this a mixture called 'salt cat' is useful in every loft. Sand, mortar, fine gravel, caraway seeds mixed with brine and baked in an oven into a cake, is the formula, and provides for confined pigeons much of what they are in need. If the pigeons are infested with lice or ticks, a little paraffin should be rubbed under the wings now and then. It is also a capital plan to feed the birds which have not their liberty with a little lettuce or other tasty green food when convenient.

The loft for the choice birds should be light, airy, with plenty of ventilation, not too much sun, and no damp or draught. The floors should be sawdusted and the walls limewashed. The birds should not be too much crowded, and should have perches or pegs in the walls for roosting upon. If the loft is perfectly sound against vermin, the nest boxes may be built upon the floor in a row, with two compartments for each pair, or movable boxes may be made about

15 inches square without any bottom, and covered over the nest pan, a hole in the side admitting the pigeon. It is not necessary to describe any of the elaborate arrangements used by leading breeders; anyone intending to devote any considerable time and attention to breeding high-class pigeons will naturally seek out the chief works for himself, and we can recommend none better than those by Tegetmeier and Lewis Wright, the latter the latest and most comprehensive.

We now return to the particular breeds, having in our introduction referred to the Carrier as the chief English pigeon, a variety we would not advise anyone starting with, but rather leading up to. Another high-class pigeon is the Pouter, which is valued for its length of limb, *i.e.* of leg and foot, its length of feather from head to end of tail, its colour, symmetry, and pout or crop. The Pouter is a tall pigeon, carrying himself erect and blowing out his crop until it is as large as a cricket-ball. The chief colours are blue, red, yellow, and black pied and white. The pied birds have white legs termed stockings, the feathers reaching to the end of the toes, white flights, a white crescent on the crop, and a few white feathers on the shoulder. Good specimens sell as high as 50*l.* each, and to see these, the great exhibitions, such as the Crystal Palace or Oxford shows, should be visited. At these shows the best idea can be obtained of all fancy pigeons. Tumblers are much kept in London

and Birmingham. There are many varieties of them, such as Almonds, Kites, Agates, Mottles, Baldheads and Beards, Splashes, Saddlebacks, Rosewings, Muffs, &c., some of these being again subdivided into colours. The Tumbler is a small bird with a peculiar round head, which in the 'short-faced' varieties protrudes strangely in front. Some of the less valuable varieties are flown, and are much esteemed on account of their peculiarity in rolling and tumbling in their flight. We cannot advise the high-class tumbler for any beginner to commence with. The Barb, like the Pouter and the Tumbler, is a bad parent, and if its young are left to it, they will generally or mostly die. It is a valuable pigeon and is in request, but not much until it has attained two to three years of age; until then it is of little value for exhibiting, consequently it is not bred so largely as it would be. The Barb is chiefly valued for its broad skull, its shortness and thickness of beak, and its eye wattle, which like that of the Carrier must be large and round, although that of the Carrier is white, the Barb being red. The eye of the Barb is pearl colour, and the feather is either black, dun, red, or yellow. As a general rule the older a Barb is the wider is its skull, the shorter its beak, and the larger its eye wattle; indeed a good bird is continually growing into money. The Dragon, a very popular variety, is in some parts termed the Dragoon; its colours are blue, silver, yellow, red, and white. The blues and silvers have bars on the wing,

the others are plain throughout. The Dragon is a hard, thin-necked, fine yet strong-beaked pigeon, bred for keenness or racehorse-like appearance. It is a hardy pigeon, largely bred, but requiring rare judgment in purchasing. The Jacobin is again bred in four varieties, red, black, yellow, and all white. In the first three the head, flights, and tail are white, the eye is pearl coloured, and the head is covered with a cowl or hood which fits closely over it; there is also a mane, and a chain running down from the hood to the front. The Jacobin is a singular pigeon, and maintains high prices. The Turbit, one of the very handsomest of the Toy varieties, is remarkable for its shortness and roundness of head and bullfinch-like beak. It is chiefly bred in five colours, viz., yellow, red, black, silver, and blue. The wing of the Turbit is the only coloured part of the plumage (the flights being white), and in the blue and silver varieties there are two parallel bars. The Turbit has a frill or rose on its breast, and a small peak at the back of the head. It is a popular and strong pigeon, and can be recommended for breeding. The Owl is a slightly smaller pigeon than the Turbit, and has a similarly shaped head, but no peak. The colours are chiefly blue, silver, yellow, black, and white, all being whole colours except the first two, which have long bars so peculiar to blues and silvers. Fantails are pretty well known to most people, but there is a wide difference between good ones and the ordinary birds flown.

Good fantails have about thirty to thirty-five feathers in the tail; they carry their heads so far back, walking on tiptoe, as to cause it to touch the tail, at the same time they are constantly shaking or trembling. They are not much worth breeding. Trumpeters are a large pigeon, with heavily feathered feet, a shell or slight hood at the back of the head, and a rose on the forehead formed by the circular growth of the feathers. In colour they are white, mottled, or black. They are not largely bred, but good specimens are very valuable, many of the best coming from Russia. Swallows are very handsome strong birds and fine breeders; they are either red, yellow, black, or blue, the body being white except the head, wing, and foot feather, the latter being considerable. These colours are even, although some blues have bars on the wing. Swallows have a shell or hood at the back of the head. Priests are similar to Swallows, except that the head or 'pate' only is white, the rest being coloured even to the foot feather; they also have a shell on the head. There are red, black, yellow, and blue Priests. Runts are the largest known Pigeons; they are famous for pies, reaching fabulous weights. The French are large breeders of these, which in England are not appreciated so much as they ought to be. Runts would make a good return to anyone who bred them carefully for profit. They are massive though plain pigeons, blue and dun being the chief colours. Nuns are pearl-eyed birds, with

white bodies and coloured heads, tails, and flights, the latter being esteemed according to the number of coloured flight feathers. If the whole ten on each side are coloured, the bird is perfect in that point, but this is very rare. The colouring of the head extends down below the throat, constituting what is known as the 'bib.' There is also a shell at the back of the head. Nuns are good breeders, and there are blacks, yellows, and reds. Magpies are a popular variety; they are very small, have pearl eyes, and are bred in black, red, and yellow chiefly. The head is like that of the dove, and the wings and flights, thighs, and underpart of the breast only are white, the rest being of the particular colour, which must be divided from the white by clear sharp lines across the breast and the shoulders. In addition to the chief varieties we have named there are Archangels, a bronze pigeon, Ice, Suabians, Starlings, Burmese, Fire Spots, Helmets, Blondinettes, Brunettes, Satinettes, Bluettes, Vizors, Frillbacks, Hyacinths, and Brunswicks. Many of these are imported from Germany, few being bred in England, yet they have many admirers.

The last pigeon we may mention is the Antwerp, which may be divided into two varieties, the Show Antwerp and the Homing Antwerp. The former pigeon reaches great value and is bred for peculiar head properties and perfect colour; the most esteemed are Silver Duns, Blue and Blue Chequer or Checked, and Red and Red Chequer. The Homing Antwerp

has no property but power of flight and ability to return to its home from any distance. It is of course trained from its earliest days, and is much flown by amateurs in races in England, returning from the continent with ease. Belgium is, however, its home, and there races are organised as far as Rome and Toulouse, many birds returning from these long distances. Any amateur will find good pigeons pay him to breed, and to commence we advise Toys, such as Turbits, Swallows, Magpies, or Nuns.

Pigeons are tolerably hardy, but yet are subject to some few diseases. *Roup* is a prevalent form of sickness caused by cold and damp, which quickly becomes contagious ; the eyes run, and if not stopped, matter is formed and discharged. Warmth, good feeding, a little hempseed given daily, and Brown's copaiba and cod-liver oil capsules should be given.

Canker is a bad form of disease ; a yellowish pus or cheesy substance of very offensive odour forms in the mouth, nostril, ear, and sometimes on the head. It must be cut cleanly away and the part burnt with caustic or a strong dilution of carbolic acid, or it will grow again, the least remnant causing a fresh growth. A cankered bird, if unvalued, had better have its neck wrung. Wing disease, or *scrofula*, is a disagreeable complaint, generally found in the joints of the wing ; a deposit of pus is formed, and if left the wing becomes useless. In such a case the bird, if a cock, is

of no further value, although a hen may be bred from. In its early stages a cure may be effected by painting the place with iodine, though even if cured the stiffness of the joint may cause the bird to be of no further value.

Diarrhœa, a severe disease among pigeons, is cured if taken in time by administering an astringent, such as sulphate of iron or Peruvian bark, adding some of the sulphate to the drinking water. All pigeons are fond of cleaning themselves, and as this greatly conduces to their health, a bath should be placed in the centre of the loft in which they can bathe. A shallow milk pan or tray will do well, the water not being more than a couple of inches deep; it may be set in brickwork, sloping inwards to prevent the water splashing on the floor. A bath of this kind will at all times cause the birds to look healthy and clean.

CHAPTER X.

THE DOG.

Sporting and non-sporting Breeds—Kennel—Food and feeding—Breeding—Puppies—Management—Diseases.

A FEW plain instructions with respect to an animal which is invariably a prominent member of every country establishment are certainly necessary, and the instructions which will be found here are more in the form of a first lesson. Dogs are by writers now usually divided into two classes, the sporting and the non-sporting. The chief sporting breeds are Pointers, Setters, Spaniels, Greyhounds, Retrievers, and Terriers. The Pointer is popular with sportsmen fond of the gun, and with them only; the Setter is similarly used, and a well-bred animal will not kill either game or vermin. Setters, however, especially the Gordons, are often kept as favourites, being animals of great beauty. Spaniels are greater favourites in the country, being used for shooting, rabbiting, and even ratting, many being not only first-rate with the nose, but capital killers and retrievers. These are very useful animals and make good yard dogs, although it is not at all proper to turn a steady clever Spaniel

into a mere yard dog. Greyhounds are kept for coursing alone, and unless there are plenty of hares and the owner is able to keep and train them well, he had better leave them alone. Retrievers are most popular and intelligent animals, and a clever dog is of great value to his owner; they are admirable and entertaining companions, capital watch dogs, splendid in the field and good tempered, and no breed is more suitable as a companion which is not a mere ornament. Terriers comprise a large class of sharp active dogs, peculiarly qualified for a farm where rats and rabbits are plentiful. They have good noses, as a rule great powers of endurance and determination, and are very plucky. The chief variety is the Fox Terrier, a white, smooth, or broken-haired animal, with black and tan head, although the marking sometimes touches the body also. The ears fall over and are not cut, the tail is bitten short, and the dog is muscular and cobby in appearance. The Black and Tan is a larger dog, longer in the muzzle, and with prick ears, but he is not so game as the Fox Terrier and is indeed more of an ornamental variety. Bull Terriers are mostly large in size, very powerful, and plucky as lions; they are fine rabbiters and ratters, and of very good disposition. They are generally all white, with black eyes and prick ears (*i.e.* cut ears). As we simply refer to those breeds in any way suitable to a farm, we make no comments upon Bloodhounds, Foxhounds, Beagles, Bulldogs, Scotch and Toy Terriers,

nor indeed to the non-sporting varieties, the Mastiff, or St. Bernard, both being immense animals, of majestic appearance, and suitable for display only. A dog can be kept by any person upon the payment of a tax of *7s. 6d.* per annum, but puppies can be kept up to six months without any licence. If a yard dog only is kept, he should have a roomy house provided for him ; a brick house is the best. It should be placed in a dry and warm position, where it is at the same time free from the full heat of the sun and rain. If the floor is raised and of wood, he will not need any litter and will keep all the cleaner for its absence. A dog will have no insects if he is kept clean and has a thoroughly clean kennel, regularly limewashed inside. The chain should be of medium length; and he should be loosed every morning and allowed to have a run in charge of someone. Water should be within his reach at all times, as with all other dogs, and he may be fed twice a day. If there is not sufficient waste from the house, (and we caution everyone against giving much animal food), and food has to be purchased, there is nothing better, cheaper, or so little trouble as the well-known Spratt's biscuits ; one, two, or three may be given daily according to the size of the animal. A friend of the writer's, Mr. Frederick Gresham, the famous St. Bernard breeder, gives his big dogs these biscuits soaked in gravy in which flesh has been boiled. Some persons make puddings, scraps of meat from the butcher's being cut up and

mixed with coarse flour and a few cabbage leaves boiled in a copper. Boiled vegetables are capital for a change, and when meat is given there is nothing better than bullock's tripe cleaned and boiled, or sheep's paunches prepared in the same way. Oatmeal and rice are also given in a cooked state, with a few vegetables added. With regard to the treatment of a bitch, it may be mentioned that if she is valuable and of pure blood, it may be highly advantageous and perhaps profitable to breed from her. In that case she should be jealously watched, more especially about the period of heat; she should then be sent to the best stud dog within easy distance, and in all probability she will have a litter of puppies in nine weeks. These should be examined when the bitch has entirely recovered from the labour of parturition and the faulty ones destroyed, or if none are very faulty she should not at any rate be allowed to bring up more than she will rear properly, and as to this her strength must be the best guide; some bitches can bring up six or seven well, but this is quite enough. If the puppies are numerous and especially valuable, a foster mother may perhaps be obtained who will rear as many of the litter as may be required in addition to one alive of her own, unless all are destroyed, as in the case of a mongrel dog they may well be. The bitches when suckling require plenty of good food, and if they can have milk so much the better; it is the best thing they can

have. The puppies too may be taught to lap milk at three weeks, and then fed upon bread and milk or hominy boiled in milk, oatmeal and milk, and so on. At four to six weeks the tails are bitten off and the ears cut in those dogs in which it is usually done, and henceforward they must have no check, but receive constant attention, plenty of good food, and scrupulous cleanliness, and then they cannot fail to combat the diseases of puppyhood successfully and grow into fine animals. Dogs seldom ail if they are well managed; it is only bad or irregular feeding, damp beds and filth, that causes half the complaints to which they are subject. If the excreta be loose there is something wrong, and the animal must be attended to.

Among the most prevalent complaints among dogs, which may be treated at home, are *Canker in the ear.* After washing or syringing the ear in slightly warm water, use the following liniment advised by Dalziel: Goulard's extract of lead 1 oz., glycerine and carbolic acid ¼ oz., olive oil 4½ oz. Mix, adding the oil gently in a mortar, and well shaking before using.

Cold in a dog, which is similar to catarrh in man, should be always seen to at once, as it may otherwise pave the way for something more severe, especially in puppies. Warmth, good feeding, and a little aperient medicine will generally restore the patient. If a dog has a cough, a little Friar's balsam, say fifteen drops given on sugar or bread, is a capital remedy. Friar's balsam is also a capital thing for a flesh wound,

having thoroughly cleaned it with water before application.

Diarrhœa is a complaint which quickly kills an animal if it is violent and allowed to run its course. The authority we have quoted recommends laudanum ½ oz., sal volatile 2 drms., tincture of catechu 1 oz., spirit of camphor 2 drms. These are mixed, and 2 drops to a teaspoonful are given in water every three or four hours. Food is a great thing with diarrhœa, and we strongly recommend boiled rice or oatmeal, raw egg, beef tea, and if necessary port wine.

Distemper is too well known as the complaint of dogs, and it should always be watched for. Puppies badly fed and badly housed are certain to fare badly when distemper attacks them. The dog first loses his spirits and his appetite, he has a husky cough, becomes feverish, the eyes and nose discharge, and the bowels are irregular. These symptoms are always more or less marked, and the dog loses flesh rapidly. In some cases the disease attacks the head, in others the bowels, and in others again the lungs. The first thing to do is to open the bowels, and for the purpose nothing is better than a podophyllin and colocynth pill, a ¼ grain of the former and 1 grain of the latter, one pill being the dose for a big puppy and half a pill for a little one. If the bowels are not freely opened repeat the dose, after which give a dessert spoonful of the following every four hours: tinc-

ture of henbane 2 drms., chlorate of potash 2 drms., Mindererus' spirit 1 oz., sweet spirits of nitre 2 drms., and water 2½ oz. Dissolve the potash and add the other ingredients. The dose may vary according to the size of the animal. The whole time a sick dog is being treated for distemper he must have unremitting care, perfect cleanliness, plenty of disinfectant washings, and diet of as strengthening and at the same time easily digesting a nature as can be. The same food recommended for diarrhœa will do well, in addition to which, as the dog begins to get round, he may have a quinine pill daily. Spratt's patent distemper remedies are highly recommended.

Mange is a disgusting disease, and an animal afflicted with it should be immediately isolated. It must not be confounded with blotch, which is merely an affection of the skin arising from impurities in the blood. Blotch is easily cured by frequent washing with glycerine soap and dressing with glycerine and carbolic acid, about a teaspoonful of the latter to a pint of water. True mange is caused by a parasite, and should be treated with ointment composed of green iodide of mercury ½ oz. to lard 4 oz., well rubbing in the affected parts. Too much must not be left on the coat within the dog's reach, as it is a little poisonous. Mange is highly contagious; the dog is continually scratching his hair off, and bursting the pimples which appear on his skin. If it is left alone

it will quickly cover his entire body until he becomes a disgusting object. Parasites, such as fleas, lice, and ticks, on the skin of a dog, may be got rid of by constant washing with Spratt's soap. The dog must be rubbed with it until he is covered with a thick lather; this may remain a little while before it is washed off, when it will, when repeated once or twice, be found to have killed all the parasites.

Hydrophobia is a disease so serious that it may find a place here if only by way of caution to those who are frequently among dogs and who may chance to get bitten. In a case of bite we advise the use of a caustic point, which should be introduced as perfectly into the flesh as the tooth of the dog. In the absence of caustic, actual cautery with the hot iron should be performed. A mad dog may be suspected when he snaps at every object and bites savagely at the air, tears at his kennel, his chain, or at anything near him, if he displays intense thirst, paws at his mouth as though he were choking, and finally falls to the ground. It is well to cauterise any wound from a dog-bite, as cases of rabies have occurred in men even though the dog has not been so afflicted.

Worms.—The symptoms are ravenous appetite, foul breath, staring coat, distended stomach, and emaciation. Among the best remedies or vermifuges are oil of male fern, turpentine, areca nut, and cowhage. Preparations of these are now sold by Spratt and other reliable manufacturers of dog medicines, and

may be depended upon. Most medicines are administered in the food, but where this is refused, the dog should be held and his mouth forcibly held open, an assistant placing the dose, which has been mixed with lard or butter, far back on the tongue. The mouth must then be closed and held until the dog has swallowed. If he has to be drenched with liquid medicine, it is best administered through a long-necked bottle in which a cork with a hole has been fixed, unless a proper drencher is at hand. After administration the dog's head should be kept up tolerably high for some little time if there is any likelihood of his returning it. Where sporting dogs are kept a room or closed building with an outside fenced yard should be provided. Benches with clean straw should be at the back for the dogs to lie upon, and on a dry floor, with freedom from draught and damp atmosphere, they will exist in good health so long as they are properly attended to.

CHAPTER XI.

FERRETING.

Breeding and management of ferrets—Foxes.

THERE are few persons who live in the country, and are troubled with rats or rabbits, who do not have something to do with ferrets. Some keep and breed them, one of the men usually having them in his care; others prefer to keep them at a respectful distance, and send for them only when they need the help of their master, the local ratcatcher. Certain it is that the ferret is a persistent enemy to most living things, and no better method can be adopted for the destruction of either rat or rabbit than ferreting. The rabbit bolts if he has a back door, when he is either shot or netted; and the rat is brought to bay in his stronghold and killed, by the pluckiest animal for its size which we know; indeed, we question whether there is an animal existing which excels him. Ferrets, then, are a necessary evil and appendage to the live stock of the country house; therefore we will show, in as few

words as possible, how they may be bred, kept in health, fed, trained, and worked; and we are quite sure that anyone following the instructions here laid down will be able to manage them well.

The ferret is a variety of the family or order to which belong the weasel, the stoat, and the polecat and it is clearly not, as has been supposed, a domesticated variety of either of these; indeed its more delicate constitution, which cannot withstand the changeable temperature of England, is sufficient evidence of this fact, for an escaped ferret dies very quickly after the appearance of severe weather. Again, it breeds much oftener than the polecat, which only breeds once a year, and has been used for hunting for generations. In colour it varies from the yellow to the dark brown, the latter being caused by a polecat cross, which has often been made to obtain size, strength, endurance, and vigorous constitution. It has small red eyes, a tiny head with a very pointed nose, and measures in the true or white specimens 12 to 16 inches. These are the tamest and the easiest to handle, but they are seldom powerful enough for much work; moreover they are not so savage. The dark cross-bred animal often stays in the rat haunts eating the young, or lies in a burrow after having killed his rabbit. Real polecats are much larger than ferrets, besides being coarser in the head and longer in the hair. Stoats again are smaller than ferrets, though larger than weasels; they have tails sometimes black,

always black at the tip. In colour they are a dull brown in summer and a yellowish white in winter. A well-bred white ferret which has been handled from its birth will be tame enough for anything, and no harm need be feared from it. The first young ones we ever bred were discovered when grown large enough for work by two of our children, who took them from their hutch, bringing them in their arms into the house with delight; but although the little animals were by no means tenderly handled, they were quite harmless. The best thing to feed ferrets upon is bread and milk, now and then treating them to a little animal food. The ratcatcher who gave us our first lesson invariably used rats, and we often watched how slily he pocketed every one which was caught when we were ratting; a dead rat placed at the mouth of a hole will mostly draw a ferret back, if as often happens it is not disposed to return, and then if drawn sufficiently far, a comparatively wild one can be caught in the hand behind the head, when he is harmless. Milk we think should form a constant diet, although the dry food may be varied. It is usual to keep ferrets in hutches some 12 in. deep by 2½ ft. long and 18 in. wide, with a compartment at one end for sleeping or breeding. It should be very strongly made, and fitted with tin about the corners and edges, and a perforated zinc window in front 12 in. by 6 in. It should be regularly provided with clean straw, which is put in through the lid at the top. As every care

must always be taken with these animals. it is most advisable that the lid should be constantly kept locked, with the key in the pocket of the feeder, or, as has occurred with us, accidents may happen to live stock of a serious nature. The hutch should be fastened to the wall or placed on a small shelf some 3 to 4 feet off the ground. It is not always easy to keep them in the best of health, if attention is given, and though some persons give them a small yard or apartment to themselves, which conduces to their health, this is not an advisable plan where there are children. The doe, or jill, breeds twice yearly, going with young six weeks. She generally has a litter of six at a birth, at which time she should not be disturbed, or she may eat them. The little ones are blind for some weeks, but afterwards grow fast, and soon become fit for work; and when they are able to feed themselves they should have frequent supplies of bread and milk. They will hunt at eight weeks old, and at this age their first lesson should be given. In the first place they should never be tormented, or they will be liable to snap at anything. If necessary, wear gloves when first handling them, and let them bite; they will soon become used to you and give it up. When they fasten anything with their teeth, press towards them, when they will leave go, or on the contrary they will not relax if you pull away. The youngsters must be tamed before being trained, and though they should be well fed, they must not get fat; a tendency that way should

be a sign to reduce the milk diet with water, which should be always before them. It must not be forgotten that the practice of starving ferrets before work is a bad one, as it induces them to kill and suck the blood of the animals they meet, whereas a well-fed ferret will not do this nor lie up, but continue to hunt, as is its nature, until exhausted. When fit, the best hands catch alive a half-grown rat or two, which they place in a lumber room or some place where they can hide though they cannot escape. The ferret is turned in and watched; it will quickly be upon the scent, and having killed its prey will have acquired confidence and courage which will help it in its more severe trials in holes, &c. An old rat might prove too powerful, hence it is not advisable to put the ferret to one, as at any rate it might be intimidated. A rabbit ferret should in the same way be tried first of all with a half-grown rabbit, which he may be allowed to taste when killed, but he should be rewarded by a good feed of bread and milk. When taken to the warren, teach him to drive them as much as possible, as this is his duty, and not killing; to this end he should be put in a burrow which has a bolt hole. If the rabbit cannot bolt the ferret will soon kill it, and if he has been well fed will seek fresh prey, but it often happens that he lies so close that the ferret cannot reach his head and fixes upon his back or leg. We have seen rabbits bolt with the ferret firmly adhering to the hind quarters. Sometimes the ferret can be induced

to drag his prey out, and this we have often assisted him to do by judicious management of the line, rewarding him afterwards. A line is a necessary part of the ferret tackle, and should be stout, long, and strong, and attached to a little leathern or other collar, which, while allowing the ferret ample play, will not come off or break. Care must be exercised not to use a line where there are roots or anything likely to catch the line, or the ferret may be fastened underground. Should the ferret feed and lie up, a dead rat or the entrails of a rabbit placed at the mouth of the burrow may entice him, a larger ferret may be put down to drive him, or lastly he may be dug out. When working, it is a good plan to pour a little milk in the hand before putting him down each hole, and let him drink; it is a refresher and does him good. It is also a good plan when ferreting to have at least two or three, which are hunted in turn, as one ferret cannot fairly be used for more than two to three hours. As a general rule the ferret will tell you whether a rabbit is at home, for he is disinclined to enter if he is not; whereas, if the hole is tenanted he runs down with avidity, and if drawn up with the line his paws will in all probability be found covered with fur, a sure sign of bunny's presence. Some persons carry their ferrets in bags, but a small box is the best, well lined with hay or straw, as in the winter they get very cold, from which they suffer severely, and should have every advantage that warmth can afford. The box

which is used by ratcatchers should have a strap for the shoulder and plenty of vent holes. A muzzle is sometimes necessary; it is made as follows, though it should be borne in mind that it must never be used in ratting. Tie a fine strong cord first round the neck sufficiently tight without choking, leaving both ends free, and 3 in. in length. Tie another cord behind the tusks, round the lower jaw, leaving the knot below. Bring these ends over the nose and tie again, so that the mouth will be just closed; next tie the same ends to the cord round the neck, and if well done the muzzle is complete. Another muzzle, which can be made with a single piece of cord, is a plain loop passed over the jaws and tied top and bottom to another cord which is tightly drawn round the neck. If the ferret is lost, the only plan is to stop the holes and bait a square rat trap with part of a rabbit, when in all probability he will be taken. It is at all times necessary to have a dog which is broken to ferrets, and as these are valuable they should be treated accordingly. Most of the terriers are the best for the purpose, and it is a good plan to bring up a puppy or two with the ferrets constantly among them, and in time they will be able to divide the sport between them. After a day's work the ferret's feet should be examined, and any cuts or bruises dressed with alum, vinegar, and salt, or the wound may run into scab, which is a disease almost inherent in the ferret, and which is best treated by the use of Spratt's mange

patent mixed with oil. Foot-rot, another complaint of the ferret, is best treated by the use of sulphur and lard until the rot is softened, when it may be washed with carbolic soap. The rot should in all cases be removed as much as possible; some use dilute carbolic acid, others tar successfully. With all diseases cleanliness must be attended to. Sweating is common to young ferrets, and is caused chiefly by want of air, close confinement, and close crowding. Wash them with carbolic soap, give a little stimulant such as brandy or quinine wine, and feed well. Sulphur may be given now and then in their milk with advantage, as well as dusted in their beds, for fleas are common with them as with all animals.

Foxes.—Almost all persons living in the country, and occupying land or keeping poultry, become acquainted at some time or other with Mr. Reynard. The writer has had a more intimate acquaintance than he desired, but living in a hunting country among friends on all hands who followed the pack, the course imposed upon him by popular etiquette and social feeling necessitated the adoption of but one course, protection against future raids. Foxhunters are certainly good fellows as a rule, but this trait is somewhat marred by a selfishness peculiarly their own. They cannot understand individuals enjoying any other hobby, and consequently look upon poultry, no matter how valuable or how valued by its owner, as so much rubbish for which half-a-crown a head is

equivalent. Losses by wild animals are in the ordinary way absolute losses, but where these animals are preserved it clearly becomes the duty of the preservers to pay for all depredations they commit. Our advice is to those who object to them, don't make yourself obnoxious to the hunting community unless they compel you. Where a person's actual living depends upon his poultry, as is very often the case, it becomes serious, and he should first courteously but firmly request payment for his losses; if necessary he should strongly represent his case to the master or committee of the hunt. Should these methods fail, he must take his own course. It is a common thing among these gentlemen to blame the roost houses, but in our experience most of the birds are taken during the day, and that generally a rainy day, so that the houses had nothing to do with it. If foxes are very troublesome, a vixen may be suspected, and in the early spring she will dare almost anything for her cubs. At that time a sharp terrier or two will do more good than anything, and is about the only method of keeping a fox at a respectful distance that can be suggested. If the cubs are within reach and can be taken, that is a good plan; they should be delivered to the huntsman. The system of poisoning foxes with dead rats is a bad one, and moreover is very dangerous to dogs and other animals. Trapping is seldom attended with success, but if war is to be declared, we recommend the gun as the safest and surest weapon.

CHAPTER XII.

RABBITS, TAME AND WILD.

Profitable—The best breed—Hutches—Feeding—Breeding—Disease—Varieties of rabbit—Wild rabbits—Trapping—Shooting—Ferreting.

THE breeding of tame rabbits is a profitable affair, although we have seldom known it conducted where wild rabbits were to be had. The variety we recommend, where they are bred for the table, is the Belgian Hare, which resembles a common hare both in colour, shape, and size. They may be procured through any of the pet stock papers at about 8*s.* each. They breed well, are vigorous, and soon ready for the table. A buck and three does may always be kept with advantage, and a two-storied hutch with four compartments would do for them very nicely. The bars should be of iron, the floors slightly sloping to the back into a little iron trough, to carry off the moisture, and a small compartment should be in the end of each for the does to litter in. The hutch above all things must be wet proof. Rabbits cannot exist in a damp spot, nor can they withstand

severe cold. A dry hutch, tolerable warmth, cleanliness, and proper feeding, will enable them to become very profitable to anyone. The foods should be chiefly dry, such as oats, meal, hay, and bran, with one or two small allowances of carrot, clover, mangold wurzel, sowthistle, or cabbage daily. Too much must on no account be given them. With us, whether as boy or man, rabbits have been favourites, and our losses among them have always been traced to carelessness or inattention. If it is decided to keep no more stock than the four old ones, the little ones must all be killed or sold early, in order that the does may breed again. When they can feed themselves, the young ones may be all put together, if a place can be found large enough and quite safe, until they are four to five months old, after which, as they begin to mature, they disagree. Feeding is best three or four times a day, giving small rather than large quantities, and when a rabbit keeper feels himself master of his subject he may begin to give more green food and greater variety, such as parsley, docks, groundsel, twigs of trees, bean or pea haulm or pods, vegetable tops, &c.; indeed they will eat almost anything, and thrive under thoughtful treatment. Wet or very moist food is dangerous, giving them rot and diarrhœa, which quickly carries themoff. Grains are also good and cheap food. Care must be taken that the little ones do not eat green food when they first commence to feed.

The does may be allowed to breed when six months old, and they will produce their litter about one month (thirty days) after being put to the buck. They make their bed for kindling in the dark compartment with hay, which should be provided, and the fur off their coats. When the young ones are a month old, the doe may be put to the buck again, thus producing six litters within a year. Large litters (we once had seventeen) are not advisable, and it is far better to keep six or eight, that they may grow into fine animals, killing the others at once.

In the country, where a great portion of the food eaten by rabbits costs nothing, rabbits are very profitable when their management is once properly understood, for losses must be expected at first, and where only a few does are kept, the corn and bran eaten will be so small as to be imperceptible if there are larger animals consuming it. Three does would rear in the course of a year, supposing them to be allowed eight each, 144 young ones, providing a large instalment towards the housekeeper's provision account, or, if sold, a respectable balance of profit. Supposing again that seventy-two were does, and kept and bred from, the seventy-five would have produced in another year somewhere about 3,600 young ones, allowing them an average of six litters of eight each. It will be seen therefore that rabbits are marvellous breeders, and that in a very short time their progress would become too large to be reckoned at all. The chief complaint

is scouring or bowel disease. The rabbit becomes thin, wasting away, and the dung is loose. Give it peameal and oatmeal mixed, with a ground acorn mixed in the meal. Snuffles, caused by dampness, is a kind of catarrh, and the rabbit should be removed to a drier and warmer spot, and fed upon warm potatoes, meal mixed warm, and a little carrot. The sick ones should never be left with healthy rabbits, and care must be taken at all times to prevent vermin taking up their abode. Mice must be guarded against, especially when the doe is breeding, and at no period should an inexperienced person feed, or his excessive kindness may prompt him to supply an abundance of green food which may be the death of a dozen. Besides the Belgian Hare there are some handsome varieties, viz., the Himalayan, which is white with prick ears and jet-black markings on its tail, feet, nose, and tips of the ears. It is not large. The Lops are of various colours; black and white, sooty fawn, yellow and white, and so on. They are very large, and valued for the length and breadth of their ears, and the correctness of their markings. The Angora is larger than the Himalayan, and is white or grey. It is famous for the length of its fur, which is very handsome. The silver-grey rabbit is a medium size and very handsome; the coat is a fine one, the hairs of the black fur being evenly silvered throughout. The Dutch is the smallest of the rabbit tribe, and is very tiny; it is a pied animal, the colours being grey, black,

yellow, blue, and tortoiseshell, the markings being very exact. There are other varieties, such as the Silver Cream, the Polish, and the Patagonian, all of which are at times seen in rabbit exhibitions.

Wild Rabbits.—As a rule many farmers are great enemies to wild rabbits, but men who are well to do and fonder of sport than the old race of yeomen who denied themselves any sort of recreation, are nowadays inclined to preserve a few head, providing as they do several days of real enjoyment, which is appreciated perhaps even more by the town friends of the farmer than by himself. A few belts, copses, or spinnies provide the kind of shelter rabbits like, and if there are a few banks or mounds they will, if allowed, quickly enough form a warren, more especially if a few tops of evergreens are piled about to provide shelter against the winter. The rabbit does a large amount of damage, not only to grass, but to corn, peas, and all kind of green crops; he barks trees, and will even venture into the kitchen garden for a tasty nibble. The great thing is to prevent their being too mischievous by keeping them well down, and if eight or ten does are left for breeding every season, these will provide young enough for plenty of sport during the following year unless the holding is a large one. We generally commence rabbit shooting about the end of August, when a successful bag is not so difficult to obtain, but in a week or two bunny will have become too cunning to allow

of many pot shots. A day now and then with a brace of good dogs will be rewarded, but as the season advances other measures must be adopted. Perhaps the most exciting sport is obtained by going round one day when the rabbits are out feeding, and stopping up all the holes. They will then be out all night, and two or three guns and a smart terrier or two may be well occupied for a few hours in the morning. The woodland should be first beaten, and next ploughed land, stubble, &c. should be carefully walked, as the rabbits lie very close; notwithstanding, unless there are one or two good shots, very many will get away, so difficult are they to hit. Another way is to use the ferret, and although this plan does not give bunny so much law, it affords tolerable sport at times. A good strong polecat ferret or two should be selected; a couple will be necessary for three or four hours' work. The holes will tell pretty well whether Mr. Pug is at home, and if so, place the line on the ferret and send him down; if he is addicted to laying up for a feed, he is best muzzled. Some one should see that there is a bolt hole for the rabbit in case shooting is decided upon, otherwise the ferret will drive him into a corner and kill him; then if, as often happens, the hole runs deep or under the roots of trees, it will necessitate a great deal of labour to get him out, and this on a cold day is tiresome and tedious to the sportsmen. Where there is a bolt hole the guns should be ready, and directly an underground rumbling is heard,

bunny may be expected. He should be given fair law, and the dogs despatched after him immediately he has received fire. Should a minute or two elapse without any sign, and the ferret not return, he may be withdrawn, and his forepaws will show by the presence of fur or fluff if there is a tenant in the hole. When rabbits are wanted expeditiously, or it is determined to thin them down, nets may be used over the holes, and into which they will bolt from the ferret, rolling over and over at times in their meshes. Rabbit nets may be purchased very cheaply ; they draw close with a slip, and are staked down over the hole with a peg. Poachers' wires may at all times be looked for, and they need a sharp eye to see them. The best are made with twisted brass wire in the form of a noose ; this is tied to a fine stake and pressed firmly in the ground, the round noose standing out just high enough to catch the rabbit's head as he hops along his run. Steel traps are used with effect by clever hands, but they need careful setting or they may be set in vain. They should be placed in the runs or in the gaps in hedges frequented by the rabbits, and covered with fine earth shaken over them from a sieve. If on to this the urine of a doe is dropped, it is almost certain to be effectual. Mr. Mechi tells us how a couple of warreners captured 1,500 rabbits in one week on an estate in England, simply with the aid of dogs and netting. A length of line was drawn from one side of a field to the other just in front of the covert from

which the rabbits emerged. At one end of this was a long net; when the rabbits were all out to feed after nightfall, the men, themselves unseen, drew the net along and properly supported it. The fields were then hunted, so that the rabbits made for the covert, but were instead caught in the net. This is an ingenious plan, and one which must always prove successful if properly conducted.

CHAPTER XIII.

RATS AND RATTING.

Their haunts—Traps—Trapping—Corsiucon's trap—Poisoning—Ferreting.

IT is a somewhat remarkable thing, that although it taxes all the energies of man to keep his domestic stock in thriving and productive condition, yet vermin are at all times to be found, and unless kept severely and continually in check, quickly increase in size and numbers. The later styles of building farm premises do not favour the rat so much as the old, but wherever cattle, horses, or pigs are kept, there, sure enough, this detestable animal will be found at some time. In old premises, old farm homesteads, there are runs and haunts the work of years, and in such cases keeping them down is a work not of a day or a month, but of continuity. Left alone for a time the rat becomes bold, and fearlessly feeds from the poultry or pig trough in the daytime, and at night, when hard driven for food, they will carry away eggs, whole broods of chickens, and at times hens and ducks. Corn is never safe from them, hence we advise

everyone to have iron corn bins, and for storing, a granary lined with iron or some metal equally safe. One of the most simple methods, and perhaps the best known, is the use of the steel trap. A dozen of these are always handy. They cost *8s. 6d.* a dozen at an ordinary shop, and if well made last a long time and do a deal of execution. When the system is first commenced, the traps may be laid uncovered wherever necessary, always taking care to avoid setting them with the fingers between the teeth; this should be an invariable rule, for we seldom knew a trapper who relied upon his own cleverness and who did not at some time get caught. A herring's head tied on, or a crust of bread, indeed a few grains of corn, will do if the other items are not handy, and if the traps are systematically set for a week many will be caught. In a short time, however, the traps will be known, and henceforth a little ingenuity must be displayed. It is a good plan to set traps close to the wall or woodwork in the buildings the rats frequent, covering them with a truss of straw. The straw will not touch the trap, but allow it full play, with sufficient room for the rats to run. A common plan is to make little holes in their runs and cover the traps with fine earth gently sprinkled over them; but probably the best plan is to set each trap in a shallow box and completely cover it with pollard or barley meal. Rats are fond of this, and will quickly visit the boxes, where they may be caught readily. All these plans

need to be well carried through, and men-servants cannot be trusted to manage them without supervision. It is almost impossible for them to think of setting the traps every night, even with the promise of extra payment. It often happens that whole litters of young rats are caught in the traps one by one, but the old ones escape. We have often thought that they are too cunning to venture near any food but what they get through the medium of younger animals; however, if the trap hidden in the meal box fail, and it seldom does if persevered with, the ferrets must be brought into requisition. In the summer time the rats take to the fields, the ditches, and banks, and the farm buildings will be comparatively free. They will, however, be found increasing there about November, but are seldom dangerous until the end of January, when we have often known them highly destructive. There is another first-class contrivance, the invention of a well-known dog judge. 'Corsiucon's,' rat trap is a square galvanised iron cage, with an inner cage in the centre in which a tame rat is placed. The wild vermin seeing this contented animal feeding at his ease, and eager to assist him, find their way into the trap through one of two doors, but they are no nearer the food, nor can they escape. Its price is about 10*s*. Poisoning is sometimes resorted to, but we warn every reader against it, or sometime or other, in spite of every precaution, an accident will happen. A neighbour of the writer's lost

a whole yard of valuable swine, on account of some poisoned rats which they had eaten. In this case the vermin, after eating the poison, had escaped into the farm yard to drink, where they died, and were of course demolished before any assistant could have removed them. Where, however, poison is fixed upon, there is no plan so good as to mix it among some barley meal placed in an earthenware or metal utensil, to prevent it being strewed on the floor. It should be placed in an enclosed stye, shed, or room which is empty, and the door locked. If this is in the way of the rats' run, they will soon find and taste it. In every case we can strongly advise the use of oil of Rhodium—it is rather expensive, its only objection—but a little rubbed on the traps, or whatever is to entice the rats, will have a certain effect. Ferreting is almost certain to prove as enjoyable to those who set about it as destructive to the rats. It is not well to muzzle or tie them in ratting, or they are prevented from killing the young rats, and a cord is inconvenient in the small windings of a rats' run. If there are two or three terriers in use, bolt holes should be left open for them and all others stopped. If near buildings, all chinks, gaps, and fissures in the walls should be temporarily stopped; men and dogs must do the rest. Rats will quickly run up the walls into a thatched roof, where capture is very difficult, and it is the old vermin that generally do this. Ferrets do their work well where they can be aided, but some-

times they have to be dug out, when the dogs must be kept on a sharp look out. It is not wise to introduce them under floors of buildings, unless they can be thoroughly depended upon, or they may be lost, when in all probability the hen house will suffer. Of all modes of keeping down rats, none are so effectual as periodical ferreting.

CHAPTER XIV.

THE DAIRY.

Analysis of milk—Supply—The colostrum—Buying or breeding—Comparative results from different races—Cooling the milk—Sale of milk—The dealer—Cream—Cream separators—The Centrifugal machine—Preservatives—Churning—Churns—Butter-making—Salting and preserving—The dairy—Utensils—Cheese—Whey—Curd—Cheshire and Cheddar cheese-making—Market—Arnold's process—Camembert—Neufchatel—Various cheeses.

Milk.—Of all foods, whether they be of an animal or vegetable nature, none contain the necessaries of life in so nicely balanced a form as milk. It is a food highly appreciated by the people, and as it and its various forms are always in demand, there is continually a craving for knowledge with regard to its production and a stream of improvements and inventions designed to aid the manufacture of butter or cheese, or to preserve the various elements of the milk itself. Milk, which is about 98° when drawn, and freezes at 32°, consists of

		Skim	Buttermilk
Water	873·00	89·65	89·62
Butter	20·00	·79	1·67
Casein	48·20	3·01	3·33
Sugar	43·90	5·72	4·61
Phosphate Lime (ash) . .	2·31	·83	·77
,, Magnesia . .	·42		
,, Iron . . .	·07		
Chloride Potassium . .	1·44		
,, Sodium . . .	·24		
,, Soda	·42		

although different animals cause a slight variation in the figures; thus casein is sometimes found as low as 30·00. The casein is in reality curd existing in atoms so small as to be unobserved so long as it is not separated from the water, in which it is not dissolved as has been supposed. Immediately a powerful acid, or the rennet used in dairies, is added, the casein is divided from the water and in its solid form becomes what we know as curd. The liquid remaining is termed whey, and it contains the sugar which as pig food is almost as valuable as the curd itself. When converted it has the appearance of ordinary sugar, but is not so rich to the taste nor so easily dissolved. Butter, the yield of which is, as well as the quality, materially influenced by the breed of the cow, the feeding, and the method of treating the milk, consists of about eighty-three parts of fat, two and a half of casein, a shade of salt, and the balance in one hundred parts of water. The butter is present in the milk in the form of globules, the sheath or coating of which

is casein. The quality of the butter is proportioned to the size of these globules, which rise to the top of milk which is allowed to stand, thus forming what is known as cream. It is only by churning or the action of heat that the butter is set free by the breaking of the casein in which it is enveloped. Thus in the first place it is a great object with some to obtain the butter quickly, and withal to cleanse it so completely when it is obtained as to leave no casein, which prevents it keeping any length of time.

It is a great point with dairymen to obtain cows which give a large yield of milk for a long period, without regard to its quality ; but with butter-makers quantity is not so much an object, and they seek animals which yield rich milk and consequently make a large amount of butter. Cows naturally give more milk after calving than at any other time, the supply gradually declining until the animal is about to calve again. Some indeed will milk right up to the birth, a practice most injudicious where permitted, others will stop the supply some weeks before the event. Ayton gives the following table of decrease in Ayrshires :—

First	50 days	. . . .	24 quarts
Second	,,	. . . .	20 ,,
Third	,,	. . . .	14 ,,
Fourth	,,	. . . .	8 ,,
Fifth	,,	. . . .	8 ,,
Sixth	,,	. . . .	6 ,,

We can only add that the specimens from which these figures were deduced must have been models.

The first milk after birth is known as the bestings or *colostrum*. By many it is valued for family use for making custards, &c. Some give it to the cow to drink, and others, and we think rightly, allow the calf to take it. It is as yellow as cream in appearance, by no means so agreeable to the taste as ordinary milk, containing as it does very little sugar and a larger proportion of butter and casein. It is also aperient in its nature, and acts upon the stomach of the calf in a most beneficial manner. The bestings daily grow less powerful in their composition and approximate more closely to ordinary milk, until at the end of a week no difference is perceptible, but it must be remembered that a cow gives more butter after calving than she does later on when her milk is richer in casein, and it is somewhat similar in regard to her age. A heifer does not yield so much as a cow with her second calf, nor the cow so much as one with her third calf; after the fourth calf, however, she steadily declines, and indeed, after her sixth, rapidly so. Thus it is the system with many milk producers to draft away their cows at about seven to eight years, while they are still inclined to fatten, an old cow being often difficult to put flesh on, however well bred it may be. Some dairy farmers breed their own stock, and where the system is a good one and the strain a first-rate milking strain, able to fatten

when of no further use in the dairy, it can be strongly recommended. But when a dairyman relies for his supply solely upon his purchases, he is always liable to disease and disappointment. His risk is at all times a heavy one, and he is necessarily obliged to keep many inferior animals when he might and ought to have in their place something much superior. He is also certain to be a loser over every cow he sells; moreover he is at times compelled to sell to obtain standing-room for his new stock. At any rate, weighing the disadvantages of the two systems, we would at all times recommend producers of milk to breed their own stock. As before mentioned, some animals yield more butter, others more milk. The following table, compiled by Professor Kedzie, shows the average production of the various breeds :—

	Sugar	Casein	Fat
Shorthorn	3·76	4·41	5·10
Ayrshire	3·90	5·08	3·75
Jersey	3·76	4·37	6·87
Holstein	4·35	4·21	6·84
Devon	4·23	5·29	3·96

Thus the Jersey and Holstein stand at the head as butter makers, and the Ayrshire and Devon as cheese makers. Among the Jerseys there have been some remarkable butter makers. Jersey Belle, a fawn-and-white, born near Boston, Mass., dropped fourth calf February 25, 1877, from which date her register was kept, or rather from March 5 to the following March 4.

In her first week she made 21 lbs. 5 oz. of butter, and for five months she averaged 19 lbs. per week. To August 1 she had made 400 lbs.; to January 1 652 lbs.; and to the end of the year 705 lbs. With her next calf she gave her first week 22 lbs. 13 oz of butter. She was fed on one quart of corn meal per day, running at grass in summer. The 'Agricultural Gazette' has during the year published numbers of cases showing the enormous yield. An Ayrshire gave 6,454 lbs. of milk in 302 days. A Mr. Dennis herd averaged 261 lbs. of butter per cow, the average duration of milking being 9 months. The milk was set in shallow pans cooled to 48° with water. Another cow gave the astounding quantity of 8,466 lbs. of milk from October 29 to June 28, the yield of butter being estimated at 445, supposing 19 lbs. of milk to yield 1 lb. of butter. A very good average is 1 lb. of butter from 12 quarts of milk; but Jerseys will do better than this, and indeed other breeds will beat it if highly fed. The breed has primarily much to do with the quality, but on the other hand the farmer can very materially improve it if he cares to do so. Again, some meadows are far richer than others, and it will be found that cows grazing on good summer and autumn pastures will do far better than in either winter or spring.

After milking the milk should be strained through a fine wire sieve, which should always be rinsed in fresh water after every straining, as with the very

greatest amount of care impurities will sometimes find their way into the milk. No efforts, however, should be spared to keep it free. Some dairy farmers cool their milk artificially. In the first place, however, it is a capital plan to aërate the milk by pouring it from the pails into a large can outside the milking shed. This sweetens it very effectually. Kent's cooler is an ingenious contrivance; there are two cylinders, one of which is fitted with a tap at the bottom for drawing off the milk, and a couple of connecting tubes top and bottom which enable the milk to circulate between it and a second and smaller cylinder which contains the cooler. In the cooler, cold water or ice is placed as required. The milk is poured in the large cylinder, filling it and the smaller one to the same level, the top of the higher connecting tube. The milk in the smaller cylinder will be much colder in consequence of the presence of the cooler, and consequently being denser will sink and find its way through the lower connecting tube, the warm milk will at the same time flow through the top opening and sink in its turn. Thus continued circulation is kept up. If any milk is drawn off, and by bringing the level below the higher opening, the circulation is stopped, a hollow cylinder may be pressed down into the large receptacle to take its place; this slides upon a rod and may be lowered to the bottom and held in any position. The cooler is also provided with a dasher that it may be utilised as a churn. There

are other coolers, among the best of which are Lawrence's, the Swartz, and the Renner's; all are more or less costly, and though there can be no doubt that they are highly beneficial and necessary in a large dairy, we believe private cow-keepers will hesitate before they introduce them. Where, however, milk is sold and sent a long distance, a cooler should certainly be used, as it enables the milk to keep sweet so much longer, more particularly if it is well aërated.

Milk is usually sold by the barn gallon, a stupid and antiquated system which in the beginning was no doubt intended to award an extra pint to the buyer, but although the new Weights and Measures Act seems to have been framed for the purpose of doing away with these strange anomalies, the barn gallon still exists and is likely to do so, as the Act did not forbid the sale of milk at per seventeen pints. The imperial gallon contains exactly 10 lbs. of water, and the churn in which milk is sent contains 17 gallons, or 170 lbs., or 8 barn gallons. Milk, however, is a trifle heavier than water, so that an imperial gallon weighs about 10 lbs. 4½ oz., or a churn of 8 barn gallons 174 lbs. odd. Skim milk is, again, heavier than new milk. The milk dealer, respecting whose profits there are a variety of opinions, pays as a rule once a fortnight, whereas his customers being numerous, and many of them in a small way, he is exposed to much trouble and some loss in collecting his accounts. He has to

provide carts to meet the trains from daybreak to night, conveying it afterwards to different districts. Supposing the producer to sell at 1*7d.* per barn gallon, which is actually 2*d.* per quart, and out of which he has to provide carts to send it to the station, pay the carriage, and often supply the churns, there yet remains a balance of 100 per cent. to be divided between the dealer and the retail dairyman, supposing the latter sells his milk at no more than 4*d.* per quart. Cheesemaking is not likely to increase so much as milkselling, as at the best its profits are 20 per cent. less than those derived from the sale of milk, whereas the profits derived from a butter dairy are regulated by the utilisation of the skim and buttermilk. Thus supposing 1 lb. of butter, of the average value of 1*s.* 4*d.* per lb., is made from 12 quarts of milk of the value of 2*s.*, a loss between the two systems of a serious nature arises. Whether this can be made up by the sale or use of the skim or buttermilk depends entirely upon the knowledge, ability, and arrangements of the producer.

Another matter which should be noticed is the purity of milk. In towns, or at any rate in most towns, dairymen are rigidly compelled to sell the pure article, but we know it to be a fact that in some country places, where inspectors are rarely seen, very much water is added. Professor Sheldon instances a case in which the cream was as high as 25 per cent., but as a rule 10 per cent. is a fair

average. In the ordinary way the lactometer, which can be purchased reasonably enough, is a useful test, although if a person knows it is to be used, he can undoubtedly cheat it. A glass gauge is another easy and reliable test. The Professor mentioned in a recent paper read before a Farmers' Club, that he had seen an ingenious contrivance at Hamburg. In this case the sample was placed in a tube similar to the ordinary gauge; the tube was corked up, and placed in a socket in a wheel which was afterwards rapidly revolved. This caused the cream to collect at the outer end and the milk at the other, the operation being as short as it was satisfactory.

In testing the relative value of different cows as milkers, it is a good plan to have two or even three pans for each, and if a rigid test is to be made, it will be necessary to have a separate cream crock for each set, churning each lot of cream at the end of a week. It is at all times well to test a cow the value of which is doubtful, as in a large dairy it is very easy without close observation to keep an animal or two which is positively losing money. Another fact is worth notice. Some milk producers prefer to keep Shorthorns or crossbred Shorthorns, with one or two Jerseys to give colour and improve the quality and quantity of the butter. This system is erroneous, for although a Jersey may give 12 lbs. per week if her milk is kept separate and the cream churned by itself, yet if her milk is mixed in common with the rest of

the dairy, it will be found that she adds considerably less than 12 lbs., probably not more than 7 or 8 lbs., to the average supply of the others.

'Milking should take place, as we have pointed out in the chapter upon Cows, twice a day, at regular hours. It should be conducted quietly, humanely, with cleanliness and patience, and every drop should be taken, the last being always the richest. With regard to setting the milk there is much to be said. Most persons use round shallow earthenware or metal pans which are deepest in the middle, others use larger metal vessels of the same depth throughout, but there is no particular advantage in one system over the other. In order to hasten the rising of the cream it is necessary to lighten its gravity. In its normal state it is lighter than the water of the milk; if, therefore, it is warmed it is made lighter still, for although the water is also warmed, it cools sooner than the cream. Hence the required result. This fact has been denied by an American writer in a discussion which has been recently raised, but whether cream be subject to the laws of solids or liquids the result is the same. Cream also rises quicker if it has been cooled. The temperature has the greatest effect upon the consistency of the cream, which assumes a stiffer form, with a skin at the top, if the dairy is warm or dry, but if the temperature is low, it is thinner and heavier. The longer it is allowed to stay on the milk the stiffer it becomes, but thirty-six hours is at all times long enough. Some

persons, however, skim twice, once at the end of twenty-four hours and again at the end of thirty-six hours, but the quality of the second cream is vastly inferior to the first. When skimming takes place, the skimmer should be quite clean, the cream should be put into a deep earthenware cream-jar and well stirred with a wooden spoon without splashing, and there it may be allowed to set or ripen until it is churned. Any spots of cream on the sides of the jar will become tainted, hence they should immediately be wiped off. When the crock is full and sour, churning should take place, care having been taken to keep it properly mixed in order that the fresh cream day by day may be mixed with the other, or it may spoil. Cream may be churned twice a week in summer and once in winter. In July and August milk often sours too soon, before the cream has had time to rise, whereas in very cold weather it sometimes rises so slowly that it acquires a bitter taste before it is skimmed. Souring in its first stages is not injurious; for good butter making, indeed, it is preferable to have sour cream for the churn, as it makes into butter much more rapidly.

Several inventions for the separation of the cream from the milk have become more or less popular, and among the most famous is the Swartz. By this system it is necessary to have water at the very least of 40°; ice water is better. The milk being set in it is quickly reduced in temperature, enabling the cream to rise in one-third the time that it does under the

common system, but it must be remembered that it is not so solid, being much more amalgamated with the milk; hence cream raised under the Swartz method is of much less value than ordinary cream. Laval's system claims to obtain all the cream from quite new milk, but at the Dairy Show of 1879 a test was made between the ordinary systems and the machine, the latter producing 2 lbs. 4 oz. less butter from 30 gallons of milk than the former, although it is claimed that the milk was not so good in quality. The Germans have been among the earliest to experiment with centrifugal machines, Professor Fuch using one in 1859. Centrifugal power is forced gravitation, which is almost instantaneous in its effects. The Weston (American) is a very successful machine, a Mr. E. Burnett, who has one in use, having recently stated in an address that on one occasion 704 lbs. of milk was run through the centrifugal, yielding 35 lbs. 8 oz. of butter, churned at a temperature of 50° in an old barrel churn in 17 minutes. A neighbour of Mr. Burnett's who laughed at the machine was induced to try it, and 160 quarts were divided, one half being run through the centrifugal and the other half skimmed in the ordinary way. The latter yielded 5¼ lbs. of butter against 8¾ from the machine-made cream, besides saving a deal of time in churning. Old milk treated in the same way yielded more butter than when skimmed in the old style. The skim milk is stated to be very thin and blue, and peculiar in flavour,

although remarkably sweet, as might be expected. It analyses as follows: Water 89·68, fat ·90, casein &c. 4·24, sugar 4·44, ash ·74. The butter loses slightly in colour, but not in quality. Another centrifugal creamer, the invention of a Swede, was exhibited at Kilburn in 1879, and awarded a silver medal. This machine separates the cream from the milk as soon as it is drawn from the cow and aërated, and it is claimed that all the cream is taken. The process is most simple, no cooling is necessary, nor is there any setting for the rising of the cream. It leaves the skimmed milk perfectly sweet, fresh, and fit for any purpose, and the butter if anything is improved. The action is as follows. A receiver, which is of steel and supported by a vertical axis, turned by a pulley 6,000 in a minute, is filled with the milk through the medium of a funnel which passes into it through a central column. The principle is that in a rapidly revolving vessel the lighter contents are gathered into the centre and the heavier to the outside; hence when rapid rotary action commences the light cream is separated from the heavier milk, and as fresh milk is poured in, the separated or skimmed milk is forced by it into a tube, whence having by its means reached a chamber, it escapes by a pipe. In a similar way the cream in the centre, when sufficiently augmented by the process, is forced by the fresh milk into another tube, and reaching another chamber, escapes by a similar pipe. We believe the Americans, with their

characteristic energy, are in advance of us with dairy appliances, and we understand that it is in contemplation to send into the English market canned or preserved cream. The idea is a good one; it would be certain to answer if the operation of preserving proved successful, and indeed the only wonder is that we have not seen it before. Among preparations for the preservation of milk, glacialine has proved itself to be one of the most valuable. A small quantity dissolved in water, and added to new milk or sweet cream, or the salt added to the butter, has a strong preservative effect. It also removes unpleasant flavours to a great extent without adding any taste of its own. One of the old nostrums is bicarbonate of soda, which acts solely as a neutralising agent with regard to the lactic acid. Salicylic acid is also used, but it is in the first place expensive, and in the second place inferior to boric acid, especially when the latter is amalgamated with sulphate of potassium, which is about the best antiseptic in use. For use, 4 grammes should be added to each gallon of milk or pound of butter. For household use milk may be boiled, when it will keep in hot weather much better; a little sugar added will keep it fresh still longer. At present much skimmed milk is spoiled and given to pigs, which should find its way to the poor, as it is one of the cheapest and best of foods. When the cream separator comes into use, skimmed milk will be as sweet as new milk is at pre-

sent, and then it is to be hoped it will be more largely sold.

The next operation to be noticed is churning, a process simple enough, but one which is very often abused by persons ignorant of the very constituents of milk. It is a good plan to make a rule with regard to the temperature of the cream; let it be 60 to 65°, and it will come much quicker and with more certainty. A thermometer may be kept on purpose, and during cold weather the cream pan may be brought into the kitchen over night and put before the fire to heat it as required. It is a bad plan to allow it to freeze in the pans, as the quality suffers, and too great a variation in the dairy is at all times bad. As the process of churning is simply to release the butter globules by breaking the envelopes in which they are bound, it is necessary that the churn should be an effective one. We have generally used the American box churn, which can be bought of almost any size, and which is very generally known. It can be conveniently cleaned, it is handy, effective, and easily turned. The old barrel churn is still used in many farmhouses. It is simply a barrel supported on a stand and furnished with perforated beaters inside. Handles are supplied, and it can be worked by manual, horse, or steam power. The Scotch or 'dolly' churn is simply a barrel some 4 feet in height and 18 inches diameter. A pole or staff passes through the centre of the lid, acting as a sort of piston, at the bottom of which is a

disc perforated with a number of holes. The staff is worked about until the butter comes. The Rocker churn is in box form, about 30 inches long by 12 deep and 15 wide. Across the centre is placed a rack made of wooden bars half an inch apart. The bars are perpendicular, and the rack fits into grooves made in the sides, that it can be taken out. Two rockers are fitted lengthwise on the churn, the cream every time it is rocked passing throughout the rack in the centre. Butter is said to come as quickly as with any other churn, and it has the advantage of permitting something else to be attended to while it is rocked by the foot. The atmospheric churn is a good one; it is a tin cylinder, varying in size, worked by a piston or plunger. This plunger is made of two parts; the lower half is hollow and perforated with holes; at the bottom is a disc also perforated, and a trifle smaller in diameter than the inside of the churn. In working, the disc is always kept below the surface, and when it is brought up, the air finds its way into the vacuum beneath through the holes in the tube or hollow half of the plunger. In order to assist the butter in coming, supposing the cream has not been warmed, this churn may be stood in hot water and the cream brought to the required temperature. The Holstein vertical is another admirablechurn, and can be obtained in sizes for 7, 11, 22, 35, 45, 55, and 70 gallons. The eccentric churn has two actions, one similar to the rotary action of the barrel churn, and a second which throws the cream from end to end,

owing to the eccentric shape of the churn itself and its diagonal axis. Bradford's Midfeather churn is a well-known useful machine. In churning the action should not be slow nor fast, but regular, and if care has been taken to study the temperature, putting in the cream a little cooler in hot weather than in cold, difficulty need not be apprehended. In winter the globules are less expanded than in summer, hence they are longer in being fractured. Some persons pour boiling water into the churn in winter, to heat it, drawing it off before putting in the cream, and in summer using cold water or ice in a similar way. When the butter has formed into granules, the milk should be drawn off through the strainer and a supply of cold water poured into the churn, turning and repeating the process until the butter is quite clean. By this means the casein is removed, and the butter enabled to keep fresh longer. In the same way it may be salted, putting one or two lots of brine in the churn, and turning it to mix well with the butter, or indeed it may be dressed with glacialine. When the butter is taken out, the churn should be cleansed by churning smartly some boiling water, then rinsed, inverted, and stood to dry in the open air. Some dairy-maids well rub the cream through a fine wire sieve before churning, in order to prevent the formation of flaky butter. The butter should never be touched with the hands, but worked with the clean wooden utensils provided, and the buttermilk finally worked out with a fluted roller. If it is washed and the

utensils dipped in fluid glacialine, and the cloths in which it is wrapped soaked in the same, it will keep much longer and sweeter. Sometimes the butter will not come, the cream after long churning remaining like whipped cream. In such a case the cream should be at least 65 or 70°, and even then we have failed to obtain butter for many hours owing to the peculiarity of the temperature and the method of feeding. Some put a little sour buttermilk to the cream, which assists the production of the butter, but in our judgment, and we have formed it from experience, it is far simpler in bad weather to scald the milk, as is done in Devonshire. It should be set on a brisk fire and allowed to heat until little bubbles appear, or to 150°, when it must be at once taken off and stood in its place. Cream which has been thus scalded rises all the better, and churns without any difficulty whatever. There is another American process which is strongly recommended by some authorities. The new milk is weighed and poured into a tank which stands in a larger tank than itself. As it is poured in, a jet of steam is turned on, heating it to 132°, or if it is desired to eradicate any disagreeable flavour in the milk, to 145°. When this heat has been attained, the larger tank is filled to the necessary height with iced water, and the cream rises to the surface very quickly. The additional advantages are that all taint is destroyed, the milk keeps sweet much longer, and it does not carry the flavour

given to it by scalding. The cream is put into the churn quite fresh, being raised by a similar jet of steam directed into the churn to a temperature of 60°. Churning is performed, and the butter made in the usual way.

The manner of making up the butter differs in different districts, some persons use butter makers, others use the hands alone; some prefer plenty of water, others use none. Our opinion is that if the dairy-maid has a cold hand (a very desirable thing), she should use that freely, and in conjunction with plenty of cold water, frequently changed, she will do well enough. Nothing can be better to work it upon than a slab of marble or slate, and well-directed efforts will enable the worker to eradicate every drop of buttermilk which is left in the butter. We must, however, admit that our own butter has long been made without the hand coming directly in contact with it, and for sweetness it will compare with any; whereas when salted it has been kept many months with every success. When the buttermilk and water is completely worked out of it, it may be made up into rolls, pats, or whatever shape the fancy and the prints at hand dictate. In summer these little matters are rather difficult, the heat causing the butter to stick to everything it touches; the best plan therefore is to obtain, in the absence of ice, the coldest well or spring water that can be had, and make the butter at an early hour in the morning, before the sun is up if

possible. If the butter happens to be too pale for the market, some persons dissolve a little annatto in boiling water and add it sparingly to the butter, so as not to colour it too highly. Salting is best done by degrees. When it is first made, the butter may be washed in slightly salted water and allowed to stand for twenty-four hours, when a little more salt may be added; a third and final working may be given in three more days, when every particle of moisture must be worked out. If it is to be sent in rolls to market, it should be neatly made up (appearance going a long way with the purchaser), weighed carefully, and each pound wrapped in a piece of damp butter cloth which should always be provided for the purpose, and nicely packed in a butter basket. If it is intended to be packed in tubs, care should be taken that they are scrupulously clean, when it may be firmly and tightly pressed down, leaving no interstices, covered over with a cloth, and the top nicely covered with salt. Butter is often preserved in crocks or jars in this manner for family use, for supposing one cow is kept, or even two, and calving is expected in spring about March, the butter will be most plentiful from the preceding May to August, when a good cow should give at least 8 lbs. a week. The surplus of this should be potted week by week as it is made until the crock is full, or if it is potted in smaller vessels it will make no difference, if it is borne in mind not to add more than 1 oz. of salt to every pound made. We should prefer to

add to it a little glacialine as well; then, if well done and the salt thoroughly mixed, it will keep well through the winter. Some persons prefer to run a little melted butter over the cloth when the jars are filled, to keep the air out; it is a useful plan, but we have not always found it necessary. If it is desired to keep butter a year or more, it should be preserved in a similar manner in small jars, and after the whole is covered with a layer of melted butter, the top hermetically sealed with parchment, or a tin cover soldered down if the vessel is made of metal. The latest and most effectual method of preserving fresh butter is that practised by the Aylesbury Dairy Company. The formula is a secret at present, but we have no doubt the preservative can be purchased from them when it is required for use.

We will now add a few words with regard to the dairy itself. It should be cool in summer, and yet within reach of the warmest part of a winter's day. There should be no drains opening into it, for the slightest quantity of impure air is absorbed by the milk and communicated to the butter and cream. The windows should be of perforated metal or fine wire, and the stands either slate or marble. These are the best forms, but they are generally made of wood, stone, or brick; the objection to these is that they are so much more absorbent, and unless the dairymaid is thoroughly trustworthy, spots or splashes of milk are often left upon them which are absorbed,

and though perhaps wiped off with a cloth, not really removed until the scrubbing brush is used. However, the probability is that the great majority of persons keeping a dairy accept it as they found it, and do the best they can. In purchasing dairy utensils it is somewhat different, as very many commence with a new set, whereas others purchase what they require at some farm sale, and to say the least we believe that very much is saved in that way. Some use glazed earthenware cream pans, others use glass, and more prefer the tin which are perhaps a little more trouble in keeping clean, but do not break so readily. Old-fashioned dairy farmers still use wooden milkpails, but for our part we prefer the zinc pails. A lax dairy-maid would wash the latter when she would not take the trouble to properly scrub the former; besides, the advantage of metal over wood is too obvious to consider further. A pair of scales should form part of the dairy utensils, also a couple of cream crocks, skimmers, strainers, a ladder on which to stand the strainers, a butterboard or slab for butter-making, butter-knives, prints, rollers, a fluted presser, and of course, a churn.

In the year 1877, England paid no less than 8,200,000*l.* for butter to France, America, Holland, Denmark, and Belgium.

Cheese is made from the casein or curd in conjunction with the fat, or that portion of the milk which produces the butter, although in some parts of the

country skim milk cheese is made in large quantities; but though sweet enough, it is tough and indigestible. In either case the chief aim is to separate the whey so completely and perfectly as to improve the quality of the cheese. The whey, although principally water (92 per cent.,) is a valuable diet for pigs, containing as it does 5 per cent. of milk sugar and nearly 2 per cent. of casein and butter. We give approximate figures because the percentage varies in most samples. At any rate the whey is one of the items of profit in every cheese-making dairy. Cheese made from skim milk leaves a little more water in the whey, a shade more sugar, but considerably less casein and fat, at a value of one half-penny a gallon according to some authorities, but in our judgment of considerably more. Very good cheese may be made from the whey itself. It will require to be heated, when the fat and curd will rise to the surface, and as these constituents are in proportion to the cheese which has been made as one to four, it follows that for every ton of whole milk cheese made, there will be 5 cwt. of whey cheese of very excellent quality, although not so rich as the former. Again, the sugar, which we have shown to be 5 per cent., may be obtained for use by evaporation or boiling down the whey, and although it is not so good in quality as ordinary sugar, it is worth at least three-fourths as much for human consumption. A writer (Mr. A. Leslie) has shown that whereas the whey from an average cow is considered to be worth little more

than 1*l.* per annum as pig food, yet supposing that whey cheese is made and sold, together with the sugar from the whey, a value of at least 4*l.* 10*s.* is reached. The argument is ingenious, though commendable, and it is at all events worth a trial where cheese-making is carried on in a large way.

In his paper before quoted, Professor Sheldon records the quantity of curd obtained from 1,000 lbs. of new milk, the average per month being 102 lbs. from April to October, the greatest quantity, 116 lbs., being yielded in November. In a similar manner he shows that, whereas the average weight of milk which took to produce 1 lb. of curd was 9·32 lbs. for the same period, it only took 7·30 lbs. in November.

In analyses of Cheshire and Cheddar cheeses, Dr. Voelcker states that the former contains 32½ per cent. of water, 32½ butter, 26 casein, and 4½ sugar, &c., against 30⅓ water, 35½ butter, 28 casein, 1½ sugar in the latter, the Cheddar cheese being considerably richer in butter and curd, and the Cheshire in sugar.

In proceeding to make cheese, the temperature of the milk is the first consideration. In the Cheddar district 86° is not too hot, although as a rule most cheese-makers vary the heat from 82° to 85°. Sometimes a little hot milk is added to the whole, at others hot water is added; in any case extreme care must be taken to use clean utensils and keep out dust, blacks, &c., and to prevent the milk scalding, or a flavour will be imparted to the whole which is by no means desir-

able. If it is to be made directly after milking there will be no need of heating the milk in summer, but rather of cooling it, and this is best done by adding a small quantity of old milk. The milk must then be set for curding, the rennet added, the pan or vat covered over and left for a couple of hours, when if the milk was not too warm, coagulation will be complete.

In Somerset, rennet is prepared from the salted and dried stomachs of calves which have been fed on milk only, and used only after they have been soaked for twenty-four hours. Good rennet is a matter of primary importance, inasmuch as much cheese may be spoiled or reduced in value by its use. Persons who make their own are always certain of its consistency, hence its preparation may be explained. The required portion of the calf's stomach having been obtained quite fresh, it may be salted or dried, and then put into a gallon of soft cold water to which a handful of salt has been added. Into this squeeze the juice from a lemon, close down in a jar that the air may be excluded, and it will soon be fit for use. The rennet is the liquid in which the stomach is steeped, and when used it may be strained from the jar.

When the curd has formed, and it must be remembered that the richer the milk the quicker it is ready, the next thing will be to separate it from the whey. In some parts, notably in Devonshire, curds are largely eaten as a delicacy ; the well-known Devon-

shire dish, 'junket,' is clotted cream covering a layer of curds. Skim-milk curds too are used for chickens, and we know of no better food to help them in their early chickenhood. The hand is the best implement we can recommend for breaking up the curd. Let it be well worked, and as much whey got out of it as possible, and then left for an hour. The whey may then be drained off and the curd once more worked thoroughly with the hand. Having again been allowed to settle and the whey drained, the curd may be put into a fine sieve and pressed by a board or cover made to fit closely on the sieve. This done, let it be again hand-worked and again pressed, as the more completely the whey is separated and the butter amalgamated with the curd, the richer will be the cheese. Lastly, the curds are spread out, salted as desired, thoroughly broken up with the hand and laid upon a cheese cloth spread over the bottom of the cheese press. The sides and top being covered, a board is laid upon the whole, which is then pressed, when the whey will soon be observed trickling down. In a few hours it may be removed, placed in a finer cloth and again put under pressure for twenty-four hours, when it may once more have a change of cloths, receive a slight salting and be returned for another twelve hours' pressure. After this it may be placed upon the shelf and turned daily until ready for use or store. If the colour is not rich enough, the next cheese may be heightened by the addition of a little

annatto which should be stirred in the milk when it is set. Some persons use boards and weights for pressing the curd, adding an additional weight each time it is pressed, but it is much better to have a cheesepress with a screw and lever, when the pressure can be so much better regulated. Others use a mill for breaking up the curd, but we believe the hand to be of more use, and indeed after a little practice any intelligent person will readily discover the best way of getting rid of the whey. Cutting it with a knife and piercing it with a skewer is usually resorted to before breaking up, both plans being effective, the use of the skewer being the most effectual when the curd is under pressure. Some makers salt the curd, others salt the cheese when it has received its final pressure, daily giving it a couple of rubbings until salt enough. Others again place it in brine for two or three days, washing it when taken out and again pressing it in the cheesepress. This pressing must at all times be carefully done; the pressure should be gradual from the first until the most powerful leverage is finally brought to bear upon it, otherwise the skin will be tough and the cheese burst, perhaps losing some of its richness with the whey. The room in which the cheeses are ripened should be tolerably warm, uniform in temperature and dry, but when ripe the room in which they are stored had better be cool, as they will thereby keep better and retain their weight. In some parts of England the dairymaids rise with the

sun, light the fires for heating the vessels, skim the pans, milk the cows, mix the cream with the milk in the vats, warm it and add the rennet before breakfast. After this meal the whole day is devoted to working the curd, pricking, cutting, and pressing it, attending to cheeses which are already in the press, turning those which are ripening, cleansing the vessels, utensils, cloths, and floors, and sometimes churning in the bargain.

The method of cheese-making known as the Arnold process differs from English systems, inasmuch as churning is conducted prior to the setting of the curd and while the skim milk is warming to 86°. When the butter has come the buttermilk is added to the skim milk, and the whole heated to 96°. In the Cheddar district skim-milk cheese is made from curd which is allowed to become quite acid before it is salted, the whey on the other hand being taken from it while it is sweet. By the Arnold process, however, better cheese is made by allowing the whole curd and whey to become acid before separating, although not too much so. The curd is then worked, milled, salted, and pressed in the usual way. Cheese made in this way is spoken highly of, and sells well in the market.

Visitors at the late Dairy Show at the Agricultural Hall will have noticed the various cheeses, the productions of different countries, and in some cases no doubt much curiosity was excited as to their manufacture. At the time we examined most of

them, as part of our critical duty, but we failed to find any of the soft cheeses to excel the now well-known Camembert, Neufchatel, and Bondon. The popular Camembert is made as follows. The milk of the evening, slightly skimmed in the morning, is added to the morning's milk, and transferred to earthen pans holding some dozen gallons. It is then heated to 85°, the rennet added and stirred, and the curd placed in the moulds in about three hours in warm weather, a little longer in cold. These moulds are round, and four inches in diameter, and of course perforated. The curd, which should be tested with the finger, is fit to transfer when it will not adhere, and is removed in as large pieces as possible. The moulds are then placed on mats, which are laid upon an inclined slab to drain, and allowed to remain for from one to two days, according to the temperature. When they have lain half the time intended, they are inverted and sprinkled with salt, another sprinkling being given at the end of the time, when they are placed on shelves for a couple of days, and finally transferred to the drying room, which is ingeniously fitted to maintain an even and dry temperature. Turning takes place daily at first, especially if the weather is damp, and finally once in two days. They soon become mouldy, in a fortnight assuming a yellow crust, when having remained a month they are removed to a damper room, from which the light is excluded, and where they are daily examined and turned for

another month. By this time they are fit for market, being sold when full ripe in winter but only half ripe in summer, and are sent in the packages of straw so well known to purchasers.

Neufchatel cheese, which is not as many suppose a Swiss cheese, but made at the little town of Neufchatel in Normandy, is made directly the cows are milked. After straining, it is poured into pots similar to those used for Camembert, and the rennet added. In winter the curd is removed in thirty-six hours, and in summer seventy-two hours, on to frames made of lath which have no bottom. These frames are 12 inches wide by 24 long, and are placed upon a sloping slab. A cheese cloth is placed in each, attached to the four corners, and filled with the curd, which is pressed firmly in, being frequently turned and placed in fresh cloths. It is removed at the end of twelve hours, wrapped in larger cloths, and subjected to severe pressure until the whey is all extracted. It is then moulded, the curd being pressed into a tin-lined metal mould resting on the table, dexterously turned out in perfect shape, and salted. The little cheeses are now laid out for twenty-four hours, and then transferred to the drying room, being placed upon old straw mats and daily turned for three weeks, when the blue mould will have pretty well covered them. Next, they are removed to the finishing-room, which must be damp, and darker than the drying-room, and

when the mould has assumed a reddish colour they
" are ready for market. Richer cheeses are made by adding to the new milk half its quantity of cream, but these will not keep so well as the former. The manufacture of soft cheeses pays very well, but notwithstanding the great demand for them in England, our farmers seem to entirely ignore them, although we are certain that to any taking the trouble to learn the art, a splendid return would be made. Surely there are some dairy-keepers who are spirited enough to try and compete with our French neighbours who take so much from us year after year for these little delicacies. The Brie cheese is another choice production. Although not such a favourite in England as the others we have named, yet it pays the makers well, although not so well as the Camembert, which is stated to return nearly 40*l.* per annum for each cow.

The Dutch are well-known cheese producers, and as a sample of their energy they exported no less than 66,000,000 lbs. in 1878, one half of which came to England. The Livarot is another soft skim-milk cheese, and among others not so well known are the Gournay, Limburg, Trappiste, Coulommiers, Schabzieger, and Caccio; the latter is made in bladders. The principal hard cheeses are Gorgonzola, a very rich delicious cheese; Roquefort, very highly esteemed; Gruyère, a Swiss cheese, too soapy for the ordinary palate; Parmesan, much used in the preparation of

macaroni cheese; Edam, Goudar, and Mont d'Or. Some specimens of Zulu cheese have been sent to this country, but we did not feel inclined to taste; they were in bladders, and by no means prepossessing in appearance.

CHAPTER XV.

THE ARABLE LAND.

Crops required—The land—Soils—Dressing—Wheat, barley, oats, rye, buckwheat—Root crops—Cabbage, beans and peas—Artificial grasses—Potatoes—To grow them—The varieties—Their value—Experiments in planting and manuring.

IN planning the cultivation of the arable land, the first consideration must be what crops are required for the stock of the farm, or in fact for home use; the second how to obtain an abundant yield. If after careful estimate based upon the known productiveness of the neighbourhood, the land will grow enough and to spare, the next thing will be to consider what crops may be grown for sale. On a holding of this small nature there is little probability of the usual farm covenants being insisted on, such as cultivating under the 'four-course system' and so on, so that provided the ground is well tilled and highly manured, the tenant can grow what he pleases, and beyond observing an economic and natural rule, not to grow two like green crops, or in cereals two white straws, on the same piece of ground in succession, he can please his fancy, and grow what is likely to make the

best return. It may, however, be borne in mind that a surface crop should be succeeded by a deep feeding crop, the roots of which penetrate well down and bring to the surface the plant food.

In grain and pulse he can select wheat, oats, barley, rye, peas or beans; among roots and green crops, potatoes, mangolds, turnips, swedes, parsnips, carrots, beet, cabbage, kohl rabi, lucerne, trifolium, clover, rye grass, tares, sainfoin, vetches, and comfrey; a goodly list. In making his selection he will of course be guided by the soil, which it is not likely will be suitable to all, and the convenience at his command for selling or transporting to a market whatever he grows for sale. Corn growing for sale we cannot recommend as anything like so profitable as some of the garden tribe, and but that straw is an absolute necessity which it would be absurd to buy for any quantity of stock, we should say 'grow no corn at all.' The hardworking Belgian peasant farmer has proved that even he, of all men, can buy it cheaper than he can grow it, and with him the production of vegetables and dairy produce is the first object. An eminent authority, M. de Laveleye, ascribes the abundant production of these men to 'thorough plough and spade work, well-shaped fields, ample manure, variety of crops, second (stolen) crops, house feeding of cows, and hand weeding. These matters are often, very often, advised in England, but seldom put into practice. Spade work is less utilised than it deserves

to be, on account of its cost. Our hedges occupy far too much space, and are too often choked with rubbish, growing seeds which are scattered on the land, and harbouring vermin. Our second crops are far too few, on account of prejudice and the apathy of farmers, and as for weeding we have seen many farms which were disgraceful to their occupiers, who grudge every penny expended on the hoe. In this country we have, however, some good garden farms, which are patterns to corn farmers, where every yard is utilised and made the most of all the year round, and where the profits are consequently large.

Within a dozen miles of London are one or two farms of about 500 acres upon which rotten manure is used to the extent of twenty tons per acre per annum. Spring cabbages are grown in abundance with the aid of manure, which keeps the root warm by the slow combustion of its carbonaceous properties. In another place the ground is dug in winter, radishes are sown in March, followed successively by cauliflower and celery; the cauliflowers are planted out between the celery and among the radishes. Rhubarb, broccoli, strawberries, onions, cabbages, &c., are all cultivated with equal success, producing ten times as much value as the crops of a farmer who perhaps has devoted innocently much more labour to his ground.

Should the land be heavy, its condition should be examined, and in any case improved yearly. If un-

drained it should have 4-feet drains placed 20 feet apart, with 2-inch pipes, with an outlet to carry off the water. Bush draining, *i.e.* a quantity of bushes being buried in the drains instead of pipes, we condemn; the expense is not worth it. The land should receive as much chalk, ashes, sand, brick-kiln rubbish, road-scrapings, mortar rubbish, and lime as it can carry, to make it friable and workable, or its tenacity will be too great for many crops. It should be ploughed early in the winter; this will cost about 15*s.* to 17*s.* per acre; where light land, can be ploughed at from 10*s.* to 13*s.*, that is if it is let out to be done. The ploughing should never be too deep; we do not believe in bringing the underspit to the top. Let the top soil be always in good heart and well worked, and all will go well, but immediately the lower spit which is undressed, and still tenacious and stiff, is brought to the top, those plants which are merely surface feeders will fail, and the labour of manuring and working will be in a great measure lost. If the land can be dug so much the better; it will prove costly, but an investment that is only temporary, as it will be well returned. With regard to manure it is almost impossible to give too much; forty loads of farmyard dung will be a fair dressing if that is used, but it should not be carted or spread during wet weather on any account, or the land will by treading become still heavier. Choose frosty weather. Harrowing, too, and this should be well done after a few frosts

have been on the ploughed land, should be conducted upon moderately dry days when the soil breaks up well, but is withal crisp enough to bear the men and horses without relapsing into a stiff sticky mass. Light soil is much more easily worked, one horse often sufficing to draw the plough; but unless it is favoured by sufficient rain it is not by any means to be desired. It is often desirable to dress it with clay, and pig's manure or rotten cowdung is better for it than stable manure. In tilling, too, so much stress need not be laid upon the weather. It grows carrots better than heavy land; rye likes it; cabbages do well if they obtain sufficient moisture. Oats do not care for it, unlike barley which takes to it well; and of the artificial grasses, sainfoin and vetches do admirably. The various plants suitable for cropping may, however, be more usefully treated in detail.

Wheat.—This plant should be sown in autumn, or rather dibbed, because the expense, comparatively little when on a small scale, will be amply returned in the greater yield and saving of seed. It can be done for about 5*s.* to 10*s.* per acre, according to the labour market. With regard to seed, by all means let it be pedigree to start with, and on no account should it be anything but the best to be had. Some farmers think 'anything will do for seed.' As it comes up it may benefit by a good rolling, but a thoughtful man must with all his crops see this for himself. If attacked by slugs, let it receive a dressing of soot.

When spring comes it will bring weeds with it, and the hoe must be brought into requisition and all weeds destroyed, especially those abominable perennials, dandelion, nettle, and dock. If charlock appears, let it be hand gathered before it seeds, and given to the cattle. When harvest comes it must be cut at the right time—using the sickle, bound in sheaves, and stacked heads inside. Labourers vary in their charges, but *7s. 6d.* to *10s.* an acre is sufficient for cutting. It is a good plan to get some neighbouring farmer to thrash at once, and done with it, or sparrows and rats and mice will tell upon it. The chaff should, however, not be left him, as it will come in useful for the winter, and the straw is a necessity in the yard. The average yield of wheat in England and Scotland is 28 bushels to the acre, in Ireland 26, in Belgium 21, and in France 14 bushels. The recent agitation with regard to agriculture has shown us that America can land wheat at Liverpool at a trifle above *32s.* per quarter. The freight and transport cost under *7s. 6d.*, against *25s.*, the cost of production in the States; and this for wheat weighing 56 lbs. to the bushel, or 5 quarters to the ton. If this is so, and there is no immediate cause to suppose the supply will be limited, to say nothing of the capability of Canada, Australia, and South Africa, it may well be worth the while of English farmers to at least study what else they can grow. Wheat does well in a heavy soil, and an old authority referred to in

Chapter I. tells us that 'it will yield twelve hundredfold if dibbed in rows 9 inches apart from grain to grain, and 18 inches from row to row; the number of seeds,' he continues, 'that will be required to plant an acre is 38,719, or not the 17th part of one bushel.' He tells us that this will yield 47 bushels per acre, but so much must not be reckoned upon. Some practical men advise trench ploughing for wheat, burying the upper spit and presenting fresh soil to the influence of the air, at the same time resting the effete surface, thus doing away with rotation, and enabling wheat to be sown year after year.

Barley is a good home crop, the straw being relished by cattle, and the grain coming in very useful for feeding purposes in its ground state; it moreover is always saleable. Some farmers sow in autumn, but we prefer the ground to have been mellowed by the frost, and to sow late in February or in March. Though it likes light soil, it does very well in heavy, and is a good surface feeder; hence it is frequently sown after turnips on which sheep have been fed with cake. Land for barley should be ploughed with a surface plough, and the seed used 'Hallett's pedigree' or some equally good. Some persons now and then crop it after wheat, the latter being a deep feeder. It is usual to sow clover with the barley, which protects the young crop and helps it forward. When harvested, the clover will have attained a tolerable height, and be cut with the barley, therefore it should lie in

the swathe for the clover to dry before stacking, and after thrashing it will be all eaten together by the stock. Barley should be dibbed the same as wheat, when 1 bushel to the acre will be sufficient.

Oats grow almost anywhere, being often used as a first or cleaning crop on reclaimed land; but they do the best on a deep rich soil, and the worst on thin or sandy ground, wanting, as they always do, plenty of moisture and food. They do well on a colder soil than barley, and are not so particular in their growth if the land is over or under manured. Black Tartarian oats are the best, and these may be sown or dibbed in April, or in some seasons even in May, but when ripe they must be harvested quickly, as they are more liable to shell out than other kinds. The straw is a valuable fodder for cows, and on this account, as well as for the provision of feed for the horses, a small quantity should always be grown.

Rye is not grown so much as it deserves, although it is much used as a protection to more delicate plants by garden farmers. It does well on sandy or poor soil, and ripens in colder weather than any of the above-named cereals. It is very often sown mixed with wheat.

Buckwheat is a grain largely used in France, where its undoubted value is appreciated. It will grow on poor or sandy soil, but a rich, lightish land suits it the best, if not too dry. The plot selected should be well pulverised by frost after the plough, well manured,

and reduced to a fine grain by harrow and roll, and the seed drilled in rows about 12 inches wide, to enable the hoe to get between them. Early May is time enough for planting unless there are frosts, when it had better be deferred for a week or two, as these are fatal to it, and 1½ bushel of seed will do to the acre.

Mangold Wurzels are now so generally used for stock that it is always well to have some grown, and with careful husbandry an acre or two will grow a large quantity. They should be sown the end of April in drills or dibbed in a foot apart in heavy rich soil; light soil they do not like so well, unless during showery weather. The plot should have been well worked and manured, and harrowed and rolled very fine for this crop, which resists a lumpy bed. If drilled the young plants must be thinned to a foot apart, when they will soon make progress, and the surplus plants will probably come in useful for odd corners and bare patches. The hoe will be constantly needed to give them room and air, but it should only be used during dry weather, as many weeds have a knack of reviving if cut down during wet. Mangolds grow larger crops than Swedes, and do better in clay soil, but if sown in light land the globes should be used only. When taken up the head should be cut off an inch above the crown, as, if too close, it will bleed and decay the sooner; for that reason some farmers let them lie a while before topping. They then need storing for the winter, as directed for potatoes,

and will prove a valuable and acceptable food. If when mangolds are frozen they can be put into a fast running stream for twenty-four hours, we believe they will be restored; at all events the plan is a preventative, and should any happen to be taken up and a sharp frost come on, it should be tried.

Swedes do not crop so largely as mangolds, but are a valuable crop for sheep feeding and manuring the ground, so that if there is no use for them they can be readily sold. If therefore they are sold to feed off, it should be stipulated that the sheep are fed upon cake at the same time and hurdles found. They do well either on heavy or light land, standing better on a chalky soil. In sowing they can be planted (in May or early June) later than other root crops; they should be drilled in heavy land in two-foot rows, and thinned closer than mangolds, but in light land it is better to sow them broadcast. They do all the better for manure and on light soils; pig dung is best, with a slight dressing of salt. The tops will prove useful for the cows.

White Turnips may be treated similarly to Swedes. They are not partial to clay, although they thrive fairly to if it has been well worked, requiring as they do room expand. They are better sown about midsummer, although some sow much later. In drilling, 3 or 4 lbs. per acre are sufficient, but in sowing broadcast 6 or 7 will be required. Should the fly appear, the plants will be all the better for dusting with lime.

Cabbage.—Under this head are many varieties, ome of which may be grown solely for market, and thers, as the drumheads, for stock as well. Cabbages ke a rich deep stiff soil, and appreciate plenty of anure, especially liquid. The seeds should be sown in autumn or spring, or young plants can be purchased. The soil being well pulverised and reduced to a fine surface, the plants may be set out in rows 2½ feet apart each way, and if the beds are in good heart they will yield even better than mangolds. They are much relished by cows, though they give a flavour to the milk, and are very fattening, more so even than the turnip, and will feed a greater number of animals off the same ground, though it must be remembered they cannot be stored like the roots, and must be consumed as they are cut, as decayed cabbages are injurious to cattle, unless the American plan of packing be tried, and it is said to answer well even for four months. A hollow trench should be scooped out and the earth piled on each side of it; the cabbages are packed head downwards, covered with straw, and then with a good layer of earth to keep out the frost; the closer the packing the better. Although the cabbage tribe make a great demand on the soil, they return a great deal back to it, and must be considered most valuable for feeding purposes.

Kohl Rabi is a plant which is practically allied to both turnip and cabbage, bearing leaves similar to the latter, and at the same time a root. It is cultivated

in a similar way to the turnip; it is hardier and not so particular as to soil, but not so nutritious, though an estimable plant, especially as it will keep if well stored.

Parsnips are valuable for stock as well as for market and home eating. They need a deep rich free soil, which has been well manured, but do not need manure at the time of sowing. The ground should be in fine cultivation, when they may be sown in March in drills 12 inches apart, to allow of hoeing. When sufficiently grown they should be carefully thinned to 4 or 5 inches apart. Some persons take them up and store in October, others leave them in the ground, covering them with leaves or straw. The parsnip, in addition to its feeding and culinary properties, makes good wine, and in Ireland a kind of beer is made from it. A good way to procure very fine roots, although scarcely applicable to field culture, is to open trenches 20 to 24 inches deep 2 feet apart, manuring each with good rotten dung and filling each trench with the earth dug out of the next. Sticks should mark where the manured trenches are. In planting the seeds a dibber should be used 2 to 3 inches in diameter, and with a cross bar fixed 24 inches from the point, for treading on. With this the holes should be made to the bottom of the trench, 8 to 10 inches apart, the holes being worked larger than the dibber itself. Into these holes put well-sifted old compost mixed with sand, gently forcing it down to the bottom,

and on the top, half-an-inch deep, drop in two or three seeds. When up, they must be thinned to one in each hole, which they will exactly fill.

Carrots.—No more valuable crop can be grown than this; it is a favourite with every animal on the farm, and horses are not only extremely partial to it, but can work upon carrots as well as upon corn. Its chief demand is light land, which should be manured and dug deep in winter and well pulverised by the frost. When fine harrowed and rolled, the seeds may be drilled in March as for parsnips, and thinned in April. Carrots do not do well at all in clay unless it is well cultivated, but they thrive in peat and well-manured sand. To grow them large, treat as advised for parsnips, but in all cases, to prevent scab, it is best to use animal manure instead of common dung. Some persons sow 12, others 18 inches apart; the soil, however, should be the best guide. In thinning it is best to hoe out to 3 inches apart, and next to 6 inches, after which the hoe may be freely used for weeds only. Carrots are capital food for fattening either pigs, sheep, or cattle, and will store well if the tops are cut off. Under favourable conditions they should yield 15 to 20 tons to the acre. It is not advisable to save the seed from carrots, as however fine the stock and careful the selection, the quality deteriorates year by year.

Beans are generally a favourite crop upon heavy lands, which are more suitable to them than to anything

else. They do well in stiff soil, which they cleanse, being hardy free growers, and hence are not exactly the plants with which to sow clover, although if the rows are wide apart, turnips may be drilled between them in May, but this would be too tedious for any but a small holding or garden farm. Beans, being deep feeders, the ground, which should be drained, will require deep ploughing and well harrowing. They may be dibbed in rows of 18 to 24 inches and 4 inches apart, when the horse hoe will be able to get between them. Some persons drill them in double rows on strong soil, but this has the objection of preventing good close hoeing. Some persons sow in October or November, others from January to March, but the safest guide will be found in the custom of the neighbourhood. A good crop should yield 30 to 36 bushels per acre, at a weight of 66 lbs. the bushel. The straw is little esteemed as fodder, but may be trodden into manure by the animals of the yard.

Peas.—Much may be done with this crop if it is thoroughly cultivated and within range of a market. Mr. Mechi has shown that even on a stiff arable farm he can grow table peas at a profit. How much more profitable then should they be if grown upon more suitable land and cultivated more closely. Peas like a light or calcareous soil, always doing better if helped with lime or gypsum. They do not flourish well on a wet soil. Grey peas for feeding (and there is nothing better for pig feeding and the production

of rich manure), are sown from December to March, and hoed in April, the crop being a rather bad one for weeds. Table peas may be sown February to April, with more space between the rows, and the higher the growth the greater the width should be, but 18 inches should be a minimum. About two bushels are required for an acre, which should yield from thirty to forty bushels. When cut they should be turned daily to dry and be threshed quickly, and the haulm will be found excellent fodder. Peas like high cultivation, and the more manure the better the crop.

Tares, sometimes called *Vetches*, though they grow tolerably well anywhere, are much more productive on a good dry calcareous soil. On strong clay they require rich manure, but the land must not only be drained, it should be well ploughed in early autumn and finely harrowed. It may be sown broadcast, three bushels to the acre, and harrowed in from September to November in rotation, so as not to come in all at once, but be ready to cut for the stock as required. Tares are used in their green state and come in about April, a good crop averaging 15 to 20 tons to the acre; a very valuable help to the stock when the meadows are shut up for hay, more especially if cut into chaff with hay and straw, to which it adds a relish. Sometimes tares are sown with a cereal, the latter occupying the ground after they are off, but this is stealing a crop between the seasons. It

may, however, answer very well under favourable circumstances if the necessary work is well done.

Lucerne.—This truly admirable plant should find a place on every farm; its perennial nature, its hardiness, its abundant growth, and its feeding properties all combine to make it one of the very best fodder plants known. Lucerne will grow on any land, although it does best on a light rich or calcareous soil. The plot should be ploughed deep and manured with a good dressing of farmyard dung, and the seed dibbed in the autumn in rows 18 inches apart. About April the hoe must be freely used, and it should be understood that being a permanent plant the first year's cultivation should be complete although it be costly, therefore the hoe must not be spared. Lucerne is a deep feeder, and does well in dry seasons when other plants starve, yet it appreciates liquid manure, which should be freely given, especially as the sward grows older, or it may wear out for want of dressing. It is about the best and largest cropper of any grass of its kind, and though only one small cutting can be taken the first year, after which, as in all succeeding last cuttings, the crowns must be protected, it will give three cuttings a year afterwards, estimated by some authorities at from 25 to 30 tons. Indeed during its third and fourth years some persons cut four times, but they manure accordingly. Lucerne is an earlier crop than clover, and is a capital food for fattening stock, though on account of its succulent

nature it should be given at first chaffed in conjunction with straw. At one time it was the practice to sow in April and transplant in the autumn, the best plants having the tops and roots cut off, and being immersed in water a night before planting 2 feet apart each way. Although such a method undoubtedly made a marked difference to the first year's crop, it would be nowadays far too tedious for extensive plantations.

Clover is another capital feeding plant, which has the inestimable advantage of making good hay; thus it has a double value, for as hay it obtains ready sale at all times. Red clover (which is the best kind) does well on heavy land, but it must be remembered that it is a greedy plant, deep rooted and hungry for manure, and as it exhausts the soil to a great extent of the virtues it especially feeds upon, it is seldom cropped upon the same ground twice within eight or ten years; at the same time it is very useful for restoring fertility after cereals. It is usually sown with oats or barley about May, and as it grows rapidly its head is cut when the corn is harvested and eaten with the straw by the cattle as before mentioned. It should be borne in mind that as the ground cannot be weeded when clover is up, every endeavour should be made to cleanse it before sowing, as the plant stands for two years. The second spring it should be well rolled and manured, and if it has been manured in the autumn all the better. as farmyard

dung will have been some protection to the crowns against the frost. It may then be cut three times as it comes to a head, and being carefully made should be stacked as described for meadow hay, unless fed green. Any barren patches that show themselves should be sown, and if it happens that the crop is a failure, it is best to plough it up at once rather than risk the loss of a year. Under favourable conditions it will yield 15 to 20 tons per acre.

Sainfoin is a useful plant, and although not so valuable as either clover or lucerne, it has one qualification, it will grow where clover will not, and however barren or exhausted the land, sainfoin will not be denied. It is a perennial, a deep feeder, and produces from 15 to 20 tons to the acre. Its general treatment is the same as for clover.

Trifolium incarnatum, another grass of the same order, and as a green crop for one cutting, is grown sometimes instead of tares, but which of these two spring fodders should be sown must be left to the discrimination of the occupier, who will be guided by the custom of the country. Trifolium does well on heavy land, and is much relished by all animals, especially horses. It is not easily made into hay, taking a long time to dry, but in a hot season it may be attempted.

Italian Rye-grass is a green food which has been strongly recommended by many authorities, but it is nevertheless little cultivated. It is better than the

best hay, and if well dressed or manured with liquid manure after each cutting, may be cut four or five times. Under such circumstances it gives the greatest yield in a dry climate, and prefers a loamy calcareous or alluvial soil. Rye-grass is a splendid food for stock, and cows give a better supply of milk when fed upon it.

Prickly Comfrey (Symphytum asperrimum).—This is an old plant, which during the past year or two has come largely into use, and it is to be hoped that the usual lack of sympathy for anything new will not in this case deter people from giving it a trial. It is a perennial, hardy in the extreme, by no means particular as to where it is planted, and the largest cropper known. Prickly or Caucasian Comfrey is a native of the Caucasus, as its name implies, and although it has been known in England for nearly a century, it has been little cultivated owing to the difficulty in obtaining the genuine plant, and to the present day many farmers have never heard of it; but be it remembered all those of our acquaintance who have tried it are convinced of its great value. It is a deep feeder and does well anywhere, but the better it is treated the better it grows—occasionally forking between the plants and manuring greatly benefitting it. Being a perennial, when once planted it stands for good. The method of planting is to purchase root cuttings or crowns, which are set in the autumn, though any time of the year will do, in rows from

18 inches to 30 inches apart each way, according to the richness of the soil. Root cuttings will be fit to cut the following May, the plant being cut about 6 inches above ground, and a second cutting, and sometimes a third, may be taken the same season. In the second year four and five cuttings may be taken. If grown from crowns the plants will be fit to cut earlier and will prove more abundant, but for all practical purposes root cuttings will do, especially as in a large purchase a great deal is saved. One great objection to comfrey planting on a large scale is its large first cost, which should not be, as a one-year plant will cut into perhaps fifty cuttings, so that if a couple of thousand are planted, a year's growth will produce sufficient to plant an acre. Comfrey likes warm, moist, deep-dug land, and spring planted crowns are quickly fit to cut. It is said that on poor land comfrey will grow greater crops than anything else, but as our experience attaches to rich land only, we are unable to endorse this, although we believe it. Upon poor land we would set the plants from 1 foot to 18 inches apart, filling each hole dug to receive the cutting with rotten manure. In rich hearty land the cuttings may be put in with a dibber. Some growers ridge the land in the same way as for mangolds, setting the cutting deep unless crowns are used, when they should be planted near the surface. The roots are very like horseradish, and when once fixed are difficult to eradicate. It flowers with a purple flower, but should be

cut before this opens, or time will be lost. As a food it is at first passed by almost all but pigs, and these at once attack it, devouring every stalk. Horses and cows, however, readily learn to eat it, and will afterwards follow for it as quickly as for carrots. It is the first green crop cut in spring, and it answers better than vetches or clover, and crops much more heavily, indeed some growers assert that they have grown eighty tons per acre. In spite of what has been said by some, we cannot recommend its being made into hay, for we do not believe it possible in any but unusually hot seasons. Comfrey, then, is to be strongly recommended, and every out-of-the-way corner or waste rod of land should be planted with it, if light and air are accessible.

Artichokes (Jerusalem) are tubers similar to the potato, which are easily grown, find a ready sale, and are useful food for pigs, although when boiled the liquor must be thrown away. It is a species of sunflower, a native of Brazil, and the prefix 'Jerusalem' is a mere corruption of the word *girasole* or sunflower. Although it grows in any soil, it does better in rich loam, the sets being the smallest, or large ones cut with two eyes to each. It is planted in March similarly to the potato, and on its appearance is all the better for having a little earth drawn around it and being kept free from weeds. The stalks grow very high, from 5 to 7 feet, but seldom flower in this country; they wither in November, when they should be cut off, and the roots dug up and preserved in sand

through the winter. Artichokes are very tenacious, and if any small tubers are left in the ground they will grow persistently. We know of a quantity being grown which produced in a bad season 3 tons to the acre, and sold at about 8*l.* per ton, a tolerably fair return.

Beets are not grown in this country so largely as they ought to be. In France they are cultivated largely for the manufacture of sugar, a practical proof of their feeding value. In England we shall expect to see them become a recognised ornamental plant before they are cultivated by farmers, and for this purpose, which makes them doubly valuable to country residents, they are very valuable, giving great effect to large beds or borders. At Burleigh House (the Marquis of Exeter's) we recently noticed many of the immense borders planted with beets, the effect of which was striking, and the yield must have been most satisfactory when the foliage was no longer ornamental. Beets are profitable for feeding purposes, and the effect of their culture cannot fail to be advantageous to the land. They can be grown upon poor land if it is properly fertilised and cultivated, but not without. An acre, requiring 12 lbs. of seed, or much less if they are dibbed as for mangolds, although they may be set closer than these, will yield under favourable conditions 20 tons; hence as beets are almost double the value of mangolds for feeding, they must be worth a trial. Beet may be sown in April about 8 inches apart in drills or holes, 4 or 5

seeds in each ; its cultivation is similar to that advised for the carrot.

Potatoes.—Probably on all but large farms this crop is looked upon with more interest than any other, and more attention is devoted to it. For the purposes of those for whom we write no crop is so valuable or so useful. A good crop provides in the first place an abundant store of one of the most acceptable articles of food at little cost ; in the second place it is an invaluable diet for pigs, and bacon can literally be provided for nothing where potatoes are plentiful ; and in the third place the potato crop is one of the most saleable that can be grown, good sound tubers of the rarer kinds making very high prices. We have often read of cases, legitimate cases, in which a crop has averaged 20 tons to the acre, and in the worst season we ever knew, a neighbour of our own grew 30 acres of a variety we shall presently speak of, the Magnum Bonum, averaging 6 tons, which considering this rare kind was selling at something like 8*l.* and 10*l.* a ton, was a splendid result in such a year. On suitable soils potatoes must pay, on unsuitable soils they will pay if properly managed, but in the first place they demand in their growing considerable intelligence and thought, without which failure may often occur, and with potatoes failure means very heavy loss. The best soil on which to grow them is a mellow, dry rich soil, exposed to the sun and not hemmed in in such a manner that air is excluded ; the tubers will then grow

freely, and as they are enabled to expand without impediment, they will harvest handsome and shapely. In stiff clay, though they do not run so large or so numerous, the shape is generally good, but the growth not being so free and unrestrained they are less floury and considerably more waxy than when grown in light soil. On thick lumpy or stony ground they are better in quality, but not so shapely as on clay. There need, therefore, be no hesitation in growing potatoes upon any land provided it is not too wet or logged with water. Drained land is always the most productive and less frequented by disease, except in a few instances where the soil is very dry; indeed as the potato requires just enough moisture for its own growth, the least superabundance is injurious and conducive to the growth of fungus, which decimates the plants in wet weather, when it rapidly spreads, but cannot spread in dry. As a rule potatoes are a good rotation crop, and many farmers in Lincolnshire and Yorkshire so use them, more particularly as they are enabled to clean the ground very considerably. After corn which has been well dressed, they do well even without manure, or after clover on which sheep have been cake-fed, but in rotation with wheat they are not good on limestone.

There is a great deal of difference in the manner of planting in different counties, and experiments which have been numerously made have proved almost anything. Some authorities advise that the best

tubers only should be planted, and that whole; others use the medium sets, yet the majority of growers use the smallest potatoes. Again, some cut the large and medium into two parts, others into several parts, providing that each set has two eyes. For our part, though we are satisfied that the whole large, and medium tubers produce the finest results, so far as size is concerned, we do not believe that in mere weight they are so successful as in cut sets. The system of planting the smallest potatoes (which should be at all times the perquisite of pigs) we decidedly reprehend, for to it we distinctly trace the loss of vitality and productiveness in various varieties. If like produces like, it cannot be supposed that a famous potato like Magnum Bonum or Grampian can long maintain its position if it is year after year deteriorated by being grown from its worst and most imperfect offspring. Nothing but degeneracy and entire loss of character can result, and this is one way in which fine varieties are so soon lost, and their places taken by new claimants to favour which in their turn will degenerate. Another way in which varieties change and lose their quality is found in the character of the plant; the flower of the potato is never visited by insects, and the pollen depends for its dispersion upon the wind alone. Thus it is carried from plant to plant, it enters into the system and of course affects the tubers, so that next year the results are varied, the variety has lost its distinctiveness, it has deteriorated, and all

through chance impregnation. It is just the same as in an animal or a fowl; the impregnation of a strange cockerel affects the progeny of the pure-bred hen, and crossing at once spoils the purity and character of the breed, and in very quick time its productiveness also. The only plan to prevent this impregnation is to adopt the plan, general with many growers, of plucking off the flowers before they are ready to open, but as this cannot altogether prevent a variety 'going off,' it is wise to obtain fresh seed of the best varieties every few years. A potato plant usually forms four, five, or six fine tubers on its main stem; it then sends out side roots, which as a rule set tubers much inferior to the others, and if long in the ground another shoot will commence to set tubers. The small potatoes from these side shoots cannot be so strong or so suitable for seed as the first sets at the main root; the common system of natural selection at once rejects the idea; hence we advise that the smallest tubers be consumed or disposed of. Before leaving the question of cutting tubers into sets we may notice a system which a recent writer (Mr. Pink) has advised for adoption with valuable seed; the labour would be too great with a large crop, but might answer with a small and select one. He advises that every potato of the choice variety have the buds cut out and inserted into a quantity of potatoes of a common kind, each bud having a whole potato to itself. Of course every bud must first be taken out of the common

potato. When completed, if put into a warm pit or house they will unite like a graft and begin to grow; they may then be planted.

Seed potatoes should be kept through the winter in a dry place, laid exposed to the air, but by all means protected from the frost; they require cold a few degrees short of frost, but immediately they are touched with that, the vital principle is affected and for seed they are useless. They should not be allowed to throw out long thin shoots in the dark; indeed shoots should not be grown until just before planting time, when they may be encouraged by being moistened with water. Sprouts should never be rubbed off a potato, as it materially weakens them, and the call made upon the sets for second shoots is often at the expense of tubers; indeed it predisposes failure. Green seed is usually preferred, but it should be ripe and dry, and on no account shrivelled. If the sets are cut, they should not be cut until actually wanted, as the atmosphere frequently influences a cut potato and causes it to rot. In setting cut sets, the 'rose' end, *i.e.* the end with the most eyes, is found the most prolific. We once read a pamphlet showing how some thousand pounds of potatoes were produced from a few pounds of seed. The principle was that of cutting each tuber into as many pieces as there were eyes, and indeed even dividing the eyes if there were two or three buds around them, the writer arguing that the buds were the embryo plants and not the eyes. We

tried the experiment of cutting up the potatoes into single eyes, some tubers cutting into ten and eleven sets; the soil was rather stiff subsoil clay and chalk, the manure light stable dung. We cannot speak very highly of the result; there were two or three small tubers to each root, but in reality it was a failure. In justice it should be stated that the season was 1879, which was in every way ill suited to the land. However, though such a plan might answer well upon a fine soil with careful treatment, it could not be attempted on a large scale with reasonable hopes of success. The first thing is to ensure a crop, which can only be done by eliminating all speculative matters from the arrangements.

The season for planting has also long been a subject of discussion, but it is now generally considered that autumn planting is unwise on account of its great risk. If the seasons could be forecast to a certainty it would be an advantage, otherwise failure is to be predicted on some soils more often than success. The best time is from early March to May, and unless there are means of protecting the early crops it is best to plant the late crops before the early, otherwise the late frosts will prostrate them. We have too often seen early planted kidneys which were showing great promise suddenly cut to the ground by the frost of a May morning. In the southern counties, and in very well sheltered positions there is not much danger, but it always exists in some degree. Rows

of peas often answer well if stuck directly the peas appear, and shelter them effectually, but where planting is carried on upon a large scale, the best plan is to fit in with the weather, taking care to have nothing up until all risks by frost and wind are past.

In an experiment made by Mr. Lawson to determine the value of season in setting, the following was the result :—

When planted	Weight of produce	Quality
	tons cwt.	
October 6. . .	3 11	Smallest
November 5 . .	5 1	
December 15 . .	5 8	Best for seed
January 12 . .	6 6	Many misses
February 7 . .	9 5	
March 7 . . .	9 10	Not quite so fine in quality
April 8 . . .	8 8	
May 9 . . .	9 1	

It will thus be seen that, although planted in fine weather with a fair average season, autumn planting was a comparative failure.

It is usual to plant the sets five to six inches deep in a light soil, and in a heavy soil to rest them on or above it, earthing up at the time of planting and again before the tops appear. There is a great deal in moulding ; it should never be done too heavily at once or too hastily. We are not sure that on a light soil moulding is not a waste of time, at all events this is the opinion of many, and we have grown fine crops without moulding at all. Heavy land on the contrary needs draining, and the furrows between the rows

act as drains, leaving the sets just above the natural level, dry but yet obtaining all the moisture they need. The rows should be from 20 to 30 inches apart according to the soil and seed, although Mr. Lawson shows that wide drills are the best. An experiment gave the following result :—

Drills apart	Seed	Result per acre	Realised, less seed
inches	cwt.	tons	£. s
18	22	8¼	15 0
24	17	7	13 0
30	13½	6½	13 0
36	11	7	15 15

the finest tubers being in the 36-inch drill. If the plough is used, the sets may be laid on the higher edge of the furrow and covered by the earth from the next, and if necessary a ridging plough can be used to earth up when the plants appear, but on heavy land great care will need to be exercised. The sets may be from 9 to 20 inches apart. They may be dibbed in light or medium soils, but we prefer trenches, as manure can then be laid at the bottom, and if the sets are placed on the manure they do better than if it is merely dug in or placed on the top of the sets. On heavy land farmyard dung does not do, as it retains more moisture than the plant requires, and therefore induces the growth of fungus. The best manure for such soil is lime or Kainite. The following, mixed with eight or ten loads of light stable dung, is a manure recommended by Mr. Colman for poor light soils :—2½ cwt. bone phosphate, 1½ cwt. sulphate of potash, ¾ cwt. muriate of

potash, ¾ cwt. sulphate of ammonia, ¾ cwt. rape dust. With this the gentleman named averaged a yield of 27*l.* per acre. Another commonly used manure is common salt 5 cwt. to 50 bushels of soot. Sandy land requires superphosphate with a layer of dung in the trenches. The following mixture has been also used with great results:—5 cwt. superphosphate, 2¼ cwt. muriate of potash, and 1¾ sulphate of ammonia; the latter may be omitted on rich soils if another hundredweight of superphosphate is added and 12 to 15 cwt. per acre allowed. On light soils each hundredweight of the muriate will increase the yield by an average of 6 to 7 cwt. per acre, and not so much by the quantity as the size of the tubers, an important element in the value of the crop. Muriate of potash may also be given with a half dressing of dung at the rate of 1½ cwt. per acre with 1 cwt. salt and 2 of lime, and the yield will be even more. There is always an advantage in using lime in the process of planting; a sprinkling in the trenches destroys slugs, and if the tubers are put into a pail of limewash for a minute or two, it enables them to resist the attack of underground vermin and parasites.

The best sorts of potato we know are Royal Ashleaf, Myatt's Ashleaf, Belgian and International Kidney, Rose, Shaw, Vermont, King of the Kidneys, Grampian, Magnum Bonum, Schoolmaster, Snowflake, Climax, Trophy, Excelsior, Rector of Woodstock, Red Emperor, Prize Taker, Redskin Flour Balls, Champion, and Victoria. Of these, the first eight of

which are early varieties, the best is Magnum Bonum, but how long it remains so has to be proved.

Magnum Bonum owes its prominence before the public to Mr. Shirley Hibberd, ever to the front in matters of horticulture, and Messrs. Sutton, the well-known seedsmen of Reading, who purchased the whole crop of the first producer, to whom the variety proved an acceptable little fortune. It is a large cropper, averaging under favourable conditions 7 to 9 lbs. to the root, elliptic in shape, white in the flesh, with a fine skin, very small eyes, and fine vigorous stems. It is moreover delicate and floury on the table. Its remaining merit, and its greatest, is that it resists disease better than any other variety. In the past year, of nearly thirty varieties planted, it was the only one which entirely resisted disease.

Rector of Woodstock, another highly cultivated potato, is like the preceding a second early. It is yellowish in flesh, round though a trifle flat, very smooth and fine in skin, which is white, a capital cropper, eats well, and is withal very handsome.

Snowflake, another variety suitable for second crop, is elliptic and flat. It is white in skin and flesh, a nice looking and prolific grower.

Redskin Flourball, a main cropper, is fine in skin and white in flesh, which is very floury indeed, and much used in starch-making. It is a round potato, a vigorous grower, large cropper, and late ripener.

Schoolmaster, another main cropper, is the hand-

somest round potato grown. It is round, very handsome, has a reddish skin, a white and very floury flesh, and is a large and valued cropper.

Red Emperor is a somewhat similar potato, but its skin is a much deeper red and its shape not so decided. It forms a very handsome show dish, and is a spendid eater and cropper.

Champion is very much used as a main cropper, probably more than any other, but though its value chiefly lies in its qualification as a disease resister, it is a large cropper. It is, however, a coarse potato, and does not in good seasons sell well in the market. Champion is a badly shaped round potato, with a roughish white skin, too many eyes, but floury flesh. We recently read a letter from a grower who had produced 10½ tons of sound Champions to the acre, set 28 inches apart, against 5½ tons of Victorias, many of which were diseased. This was on dry soil, dressed with bone dust and guano.

Vermont is a coloured kidney, medium in size, handsome, nice in quality, a good eater, fair cropper, and a second early.

Trophy, though a new and more valuable variety, is very characteristic of the Vermont.

Grampian is a round parti-coloured potato, vigorous, handsome, and floury.

International, and *Myatt's Prolific*, are both white medium kidneys.

Excelsior is a white, round, medium sized, and second early.

Centennial is a coloured round and late variety. The others are too well known to need detailed description.

Should disease appear in the crop, it will at once be necessary to consider what should be done. If the weather is tolerably dry, leave them to take their chance, and unless wet should set in, the chances are that many will escape. If, on the other hand, the weather is wet, dig up a few test roots, and should they be only slightly touched leave them, for if taken up the air would quickly spoil them. If, however, they are far gone, take them up, and either sell them or give them to the pigs as speedily as possible. Nothing further can be done to ameliorate the loss by disease, nor can it be checked. The potato disease has for many years been a subject of close investigation, but hitherto everything has failed to grapple with it when it has once developed itself; therefore the only thing to be done is to grow the plant under conditions which are the least favourable to it.

The crop should be harvested when the tubers are full grown, even though the tops may not be dead. Sometimes we have heard of unripe tender-skinned tubers which have been dug going bad, but the consequence was not that they were unfit to take up, but that disease existed which spread with rapidity upon contact with the air. Sound roots will ripen in clamp

or in store, but if left in the ground wet weather may come and quickly spoil them, therefore we say don't risk leaving them there a day after they are fit. If the weather is warm they should not be exposed to the heat of the sun, which, if they are left long, does much harm to those intended for seed.

In storing, some persons mix slaked lime among them, stirring them well, of course not bruising them, and leaving them for a week, when they are turned. It has been stated that not only does it preserve them, but arrests disease if present in an incipient form. A quarter of a hundredweight of lime will be sufficient for a ton of potatoes. We have known charcoal to answer equally well; it is a capital preservative and adheres to any diseased spots, which it renders inoperative, and the tuber is not spoiled. Potatoes which are intended for seed should never be stored in pits, where they are often induced to germinate, nor should any tubers which are or have been diseased be planted. In clamping, the base should be 6 inches above ground, and the potatoes piled in pyramidal form, not more than eight to ten bushels to a clamp; they should have straw at the bottom and be well covered with it, 6 inches of earth being covered all over them, and well beaten, to keep out the air. In pits, which answer better in dry porous soils, the system is similar, except that the base of the pit is below the normal surface of the soil.

The failure of crops arises we believe from either

frostbitten sets, or from sets which have germinated and lost their vitality, or which have been cut after having germinated. In frosted sets, which often taste sweet, a change takes place in the organisation of the tuber, which is the result of some influence upon its principal component solids. There are fifteen parts of starch to four of mucilage, and these when frosted are apparently converted into sugar; hence the rapid decay and failure. The advice of an old grower is: to plant large whole sets, don't set deep or with dung in heavy soils, harvest when the tops are green, preserve in small pits. On the other hand, we have proof that seed saved for two years from early harvested crops failed to produce, whereas late cropped seed grew abundantly.

With regard to the cost of a crop of potatoes the following figures may be some guide:—

	£.	s.	d.
Artificial manure	2	10	0
Dung, 10 load	3	0	0
Rent and rates	2	0	0
Manuring—labour	0	16	6
Plough and harrow	0	15	0
Sowing and harrowing	0	10	0
Earthing	0	7	6
	9	19	0

to which the seed has to be added, at the rate of 25 bushels to the acre.

In order to conclusively show the comparative value of whole and cut potatoes for planting, the following table will prove interesting.

A piece of ground about half an acre was divided into nine plots of equal size, and planted with 18 cwt. of potatoes—2 cwt. each—with the same quantity of the same manure. The variety of potato chosen was one known to be subject to disease. The soil was dry gravelly loam, and the planting conducted in the latter half of April during hot weather.

Arrangement of planting.

Plot 1.	Large whole sets	. . . . .	3 feet apart
,, 2.	,,	all eyes picked out but at the ends	18 in. apart
,, 3.	,,	cut across bottom cuts .	,,
,, 4.	,,	cut lengthways . .	,,
,, 5.	,,	cut across rose ends .	,,
,, 6.	Cut into sets	bottom sets planted .	8 in. apart
,, 7.	,,	rose or end sets . .	,,
,, 8.	,,	middle sets . . .	,,
,, 9.	Middle size whole potato.	. . .	20 in. apart

At the end of a month the following observations were made:—

	Appearance above ground	Proportion of failure
1	Regular, strong, vigorous	No failure
2	Very irregular	Failure about one third
3	,,	,, two thirds
4	,,	,, one third
5	Irregular	,, one fifth
6	,,	,, one eighth
7	,,	,, one half
8	Very irregular	,, ,,
9	Regular and vigorous	Scarcely a blank

Thus it will be seen that the whole sets grew the quickest and most regular and vigorous, and by the

end of September these lots, Numbers 1 and 9, were ripe and changing in the tops, whilst the others were hardly in flower, although Number 9 was planted nearly a fortnight later. When dug in October each division was carefully weighed, with the following result :—

	Produce.	Per acre, about	Quality
	cwt. st.		
1	14 6	14	Large and coarse
2	9 2½	9	Very large and bad quality
3	6 6½	6	Large and bad quality
4	10 3	10	,, ,,
5	14 7	14½	Not so large and good quality
6	13 1	13	Large and bad quality
7	14 7	14½	Medium size and good quality
8	7 5	7½	Large and bad quality
9	14 7	14½	Medium size and excellent

The above experiments, which were made by the late Mr. Niven, show first, that failure is not always caused by disease or soil ; and second, that the method of cutting sets would tend to yield more than planting whole ; and third, that the safest mode is to plant whole sets, preferring the medium size tubers, thereby gaining an additional advantage in earliness.

Of the value of the potato as food there can be little doubt. An ingenious writer says, that they will maintain a larger number of persons *pro rata* than anything else ; as thus :—

Twenty acres of land will maintain

On mutton from swedes . . .	8 men 1 year
On milk, allowing 1 cow to 1½ acre .	20 ,,
On wheat	50 ,,
On potatoes (5 tons per acre) . .	100 ,,

CHAPTER XVI.

THE GARDEN AND ORCHARD.

Value of vegetables forming a garden—Tools—Work to be done—Crops—The best kinds of Vegetables—Beans—Peas—Spinach—Greens—Onions—Asparagus—Celery—Rhubarb—Cucumbers—Marrows—Radishes—Lettuces—Tomatoes—Watercress—Nursery—Fruit-growing—Apples and Pears—Planting, growing, and varieties—Plums—Gooseberries—Currants—Strawberries—Raspberries—Cherries—Grapes—Filberts.

IT must not be supposed that in a treatise of this description the chapter upon the garden will be anything more than a concise description of the operations necessary upon and consistent with the conduct of the particular kind of holding which we have in view. Works upon gardening are both numerous and able, and to them we refer readers who, whether for experiment or pleasure, desire to enter into the subject beyond the limits which we prescribe. In the first place the garden should be considered as it were the nursery of the farm, and in the second place one of the chief sources of family supply. There are few families who are not partial to vegetables; to many they are the principal sources of support. In large towns, where prices are high and everything even to a

sprig of parsley has to be bought, vegetables form a large item in the housekeeper's account, and expense alone, even in houses of the wealthier classes, is the reason many more are not consumed. The clerk, the shopman, or the artisan, earning from 35*s.* to 50*s.* per week, at all times considers the best kinds of vegetables as luxuries, and an item of 5*s.* for his weekly supply is a matter of great consideration to him, as indeed it may well be if we estimate it at an eighth of his income. Yet, after all, how much can be purchased for 5*s.*? If he has a family, they would consume thus much in potatoes alone, without allowing for cabbage, cauliflower, onion, carrot, parsnip, rhubarb, turnip, to say nothing of peas, beans, and a host of other delicacies. If the matter is thus pursued by anyone interested in the subject, it will at once be seen that, after all, vegetables cannot be consumed half so largely as they are supposed to be or as they should be, and that they do not form that great quota in our domestic economy that they are generally supposed to do. The great and natural reason which prevents consumption is cost; for, except perhaps in the case of potatoes, vegetables are not yet considered by the million as common necessaries of life, and where the shoe pinches they are very little eaten indeed. It is true that among the very poor vegetables are sold in the byways of London in mixed lots, to enable the purchasers to prepare meals much in the same way that the French prepare their *pot au feu*, but this is

only the case where meat cannot be obtained. Until the salesmen in the great markets, or 'middlemen,' are entirely swept away, the great populations in our towns cannot obtain vegetables at anything like an approximate price to that for which they are grown, and therefore we welcome the inauguration of the co-operative societies now being formed for the purpose of bringing the grower and the public in direct contact. Let us therefore caution every vegetable grower to abstain in every possible way from dealing with middlemen, who are responsible to no one, and who return him whatever price suits their pocket or their conscience. This is the secret of their prosperity as a class, and the *statu quo* of those unfortunate producers who have so long been subject to them and their caprices.

We must first of all suppose that, like the arable and the meadow land, the garden has been thoroughly overhauled, cleaned, and drained if necessary, as without the latter operation, if at all disposed to be wet or heavy, it can never do. A good beginning is everything, and as that will rule its prosperity ever after, it is worth while beginning well. If it is shaded from the sun, let an opening be made in some way, for sun it must have; if on the other hand it is exposed to the north and east winds, endeavour to protect it, and for this we can advise nothing better than young fir trees planted two deep. If any crop is worth growing it is worth growing well, and the secret of the successes of

many of the Essex and Bedfordshire garden farmers lies in the fact that they are at as much pains to grow protecting crops to shelter their main crops as in the main crops themselves. Another matter is to economise space. Limit the paths to two feet, and let them be gravelled or sanded; grass is abominable and mischievous. If there are any box edges, take them up at once and sell them; they not only occupy space which would grow something more useful, but they harbour slugs and annually demand someone's time to trim and mend them. It is convenient if possible to have water near the garden for use in the hot months, and at the same time for growing watercress. A tool-house ought always to be on the spot, otherwise tools will be lost or mislaid, often causing a great waste of time. The house should be light and dry, and should contain a grindstone, with the following tools of the best make. Two or three digging spades and forks, a shovel, an axe, bill, pickaxe, broad and narrow hoes and rakes, halfmoon or edging tool, shears, sickle, hedging hook, and line and pins; with two or three watering cans, a water barrel on wheels, a couple of strong barrows (one wooden and one galvanised iron are recommended), a scythe and rubber, a couple of brooms, a syringe, pair secateurs, budding-knife, hammer and nails. If lawns are to be kept, a mowing machine will be requisite, and a roller is always necessary.

With regard to the general arrangement of the

garden, that must be left to whoever undertakes its management, but this we suggest, and having proved its value we speak with some authority, by all means plant espalier apple and pear trees on your borders, and small pyramids or standards of these and cherries and plums in the beds, planted so far apart that they in no way interfere with the growth of the crops. If the garden has a wall or walls, young trees should be immediately planted against them or a year may be lost, and if these little matters are not attended to at first, they often escape altogether. Every foot should be made available, and if necessary currant trees grown where space will not permit a larger tree. Except in the instances thus pointed out, the fruit should be grown in a garden to itself, unless there is no space available, in which case a plot should be marked out for the trees, which always do better if kept to themselves. As most persons dislike to see plain borders, parsley may be grown in some cases and strawberries in others (the plants a foot apart), but for our part we think plain borders are neater and less trouble, especially if they are kept neatly cut and the paths clean, high in the centre. It should be remembered that garden work comes in regular rotation, and a reading master will always have the advantage of the one who relies upon his non-reading man, consequently he should ever be on the alert, or some matters may be forgotten or postponed until too late. Work should never be allowed to stand still for want of

doing. If there is no time to do a job, engage a special hand for a week or two; better by far to pay a week or two's extra wages than lose a crop. We have known orchard pruning to be neglected and a crop spoiled through the continued procrastination of the gardener, who thought his cucumber frame or his lawns or flower beds of much greater consequence. Much ignorance and stubbornness will be met with among otherwise conscientious workmen, and nothing can overcome this but an iron will. Another grievance a master will have will be the unwillingness of men to harvest the crops quickly and get in successions or second crops. The success of these depends upon rapid action. Customarily, potatoes, carrots, parsnips, &c., lie in the ground into the winter, instead of which they should be taken up quickly, the ground dug and again planted. It should never lie idle; in summer or early autumn it should be dug and manured, and in winter or early spring ridged, weeds never being allowed to grow. Heavy ground should be cultivated with a fork and light land with the spade. The chief thing to bear in mind is that you want to get out of the ground as much as you can, and that to this end nothing should be spared, for if a good crop will not pay for the cultivation, be sure that a poor one will not. See then that the ground is properly treated and properly manured, the work well done, and when the seeds are up, kept quite clean. Should the weather be hot, don't spare the hose or the watering pot, or all

your labour may be lost. Watering should be done in the shade, and with water that has been in the sun; cold spring water is dangerous to plants. Above all, don't sprinkle; one good soaking is worth twenty sprinklings.

Peas.—These are among the earliest kinds sown, or shall we say the latest, for it is customary to sow from November right up to June. The Dwarfs should be sown in fine well-pulverised earth, a yard apart, in a well-sheltered part of the garden. Plenty should be grown in succession, nothing being more fruitful, more palatable, or more wholesome. The second sowing should be in February, and successions as soon as the last sown are through the ground. It is a good plan to cover the seed with cut furze, and so prevent the depredations of mice. Failing this, the vermin may be easily caught with the common figure of 4 traps, baited with a pea or bean. A little soot sprinkled along the rows will be found a capital fertiliser. Among the best early sorts are Maclean's Little Gem, a fine flavoured wrinkled marrow, and Multum in Parvo, a very prolific marrow, both being dwarfs; Champion, a hardy round pea, growing to 5 feet; Ringleader, a very prolific pea, 2½ feet high, and Dickson's First and Best, a superb pea, also 2½ feet. Among second earlies, Criterion, a very fine cropper of rare quality, 5½ feet high; Dr. Maclean, a wrinkled and very excellent pea, 3 feet; Fortyfold, a green wrinkled marrow, very prolific and of fine habit, 4 feet;

and Laxton's Quality, and Superlative, 4 feet, are all very fine. For the general crop, we can strongly recommend the following. British Queen, 6 feet; Magnum Bonum, a large wrinkled marrow, one of the best tall peas grown, 6 feet; Maclean's Prolific, 3 feet; and Veitch's Perfection, a strong fine cropper, 3 feet. Peas should be staked early; it is some protection to the plants, and an assistance to them directly they can take hold. We strongly recommend the plan of saving seed. Gardeners are very prone to slip this duty, preferring fresh purchases every year, but as these amount to a considerable sum in a large garden, saving seed should be insisted upon.

Broad Beans should be sown early in February, in rows 2 feet apart. Some plant them in double rows; this, however, prevents the hoe from being drawn between them. The seed should be 3 to 4 inches apart, and a little earth may be drawn to them as they appear above ground. The first planted should be ready by the end of May, and eaten green with bacon nothing is more delicious. Successions should be put in each month up to April. We think it a good plan to nip off the tops when the plant has attained a sufficient growth. The Windsor Green is a fine variety, also Early Long-pod, also Monarch, a fine prolific long-pod.

French Beans are not half so much grown as they should be. Eaten green in the pods nothing is more delicious, whereas as haricots they may be kept

to furnish delicious winter dishes. In the French markets hundreds of country women bring them for sale, shelling them as they sell, and we in England are mainly dependent on these growers for our increasing supply. Sufficient of these then should be grown both for summer and winter use. They may be planted about the middle of May, up to July, indeed so long as they are likely to be free from frost, which they cannot withstand. The sowing or dibbing should be on well pulverised and manured ground, in rows 2 feet apart, and the plants 4 inches, the seed first having been soaked. Negro is a capital variety, also Cutbush's Giant, a large-podded heavy cropper. For a second crop, Fulmer's Early, sown between potatoes and cropped when they are off, is the best; Dun and Canadian Wonder are also very good. For Haricots for keeping, the Painted Lady runners or White Dutch are the best. Scarlet runners are more prolific, and are available in so many places that they should be always largely grown. This bean is larger and more esteemed than the French bean. In the southern counties an early crop may be obtained from plants of the preceding year which have had their tops cut off after the first frost, the roots being carefully taken up with soil adhering, and laid singly near a hothouse where they can gradually dry. When dry they must be removed to a dry place, and preserved through winter. They may be planted in the middle of April, so that the crowns are covered by half an

inch of earth, with a little hay laid over. As they appear above, they must be earthed up a little. They should be planted east to west, and well attended to will produce an abundant crop. If beans are set in double rows it is best to plant north to south, or the hind row will get no sun. Successions may be sown every 3 to 4 weeks. If runners are planted in a bed, they must be staked betimes. Some prefer white runners to the red ; certainly they are as vigorous and as fine croppers, though hardly so handsome. The Champion is the best known variety.

Spinach.—This useful and delightful vegetable should be in every garden all the year round. It may be sown in March, and right up to September. The last crops will stand the winter and come in handy in spring for the table all the more readily if it has been protected ever so little. It needs plenty of weeding, hoeing, and thinning, and it will grow abundantly, but care must be taken that it does not run to seed. When ready for use all plants should be cut away but those to remain, 12 inches apart. For winter use the best plan is to sow early, say early in August. The plants will then cover the ground by October; thinning, good rich soil, and the hoe will always bring a good crop. In sowing little seed will be needed, and it should be in drills 18 inches apart for summer crops and 12 for winter. If the drills are drawn about 8 inches deep, and filled to 4 inches with rotten dung on which the seed is laid, it may be

covered with an inch of earth, leaving the top of the drill a little below the surface. The best kinds are the Flanders and Prickly for winter, and Lee's Giant for summer, the latter growing 5 to 6 feet.

Cabbages may be sown in March and April, or, in the autumn, August to September. Plant out the early sown ones as soon as they are fit, in rows 18 inches apart, and a foot from plant to plant. In the early months the autumn sown may also be planted out in vacant spots which have been previously dug, and if the season is favourable they will be fit for cutting in April and May. Leeds Market is a first-rate variety; it is a hybrid between the well-known Early York and Enfield Market, and is large, compact, and early. Improved Nonpareil is a fine variety, and Sandringham, which is a sprouting cabbage, is certain to become a favourite.

Brussels Sprouts.—Some little care should be taken to obtain a fine bed of these, because they will furnish choice dishes of most tender and delicious sprouts through the entire winter. We can speak from experience, having been successful with them when every neighbour has been without. The seed should be sown in March and April, in a fine well-dressed bed, and the plants set out as soon as fit, *in wet weather*, as directed for cabbage. Second and third plantings may be made as fast as the occupied ground is cleared, for it must be remembered they are for long enough able to supply you with their little sprouts, and every

one is a consideration. During the past winter we were supplied from early in November right through to the summer without intermission. Cutbush's Giant, and Roseberry, are the best sorts.

Broccoli should be sown during March, April, and May; indeed some of the varieties may be sown up to August. There is no more delicious vegetable than this, and it will pay for attention. Let the seed beds be well manured, as well as the beds for the plants. Set out 12 inches apart, in rows 18 inches wide. The Walcheren is the best for the main crop, and will come in up to Christmas. One sowing may be made of Cattell's Eclipse, which will stand until late in the following spring; the Hooded White is another good self-protecting Broccoli, coming in in spring; it is large and hardy. Snow's Early is equal to any, and it may be sown from March to August, coming in November to April, according to the sowing. The following is a good old plan for increasing the head of the plant. In September open trenches parallel to each planted row. Take up the plants one by one with a small ball of earth to each root, and lay them carefully in the trench, sloping, and face to the sun. Take off some of the bottom leaves, fill in the earth, and tread them firmly down. The check will the better enable them to withstand the frost, and they will flower much finer in the spring.

Cauliflowers will not be so much grown in our garden unless it has the advantage of frames or hand

glasses. For the early crops the seed must be sown in September or October, and carefully protected until the following May, when they may be transplanted in a fine well-dressed bed, protected from winds; they will then be ready for summer use. For succession, seed may be sown in March, April, or May, but the latter of these will be caught up by the first crop of Broccoli, which is certain to be a greater success. This plant requires plenty of room, and should be set 18 inches apart each way. Some gardeners prick out small seedlings into beds 4 inches apart before finally setting out. The Early London is a good useful cauliflower, and Veitch's Autumn Giant the best late.

Savoys, Kale, &c., may be sown with the Broccoli according to requirements, and planted out in well-manured ground immediately the seedlings are strong enough, taking care to select a wet day for the purpose. Drumhead is a good one, also the Green Curled. Should the beds be troubled with slugs or caterpillars, the best remedy in our judgment is to turn a number of ducks among the plants; they will soon devour every intruder.

Onions require rich fine soil, and nowhere are finer crops grown than on the rich land in Bedfordshire, which is the onion county *par excellence.* No garden should be without this plant, which is one of the most delicious, wholesome, and withal profitable crops where the soil is suitable and dry. In Septem-

ber the bed should be selected and dug, the bottom spit being brought to the top. In the following month it should have a good dressing of rotten manure or house soil, the manure being mixed with the soil with a fork, and left in the rough for the action of air and frost. In February, if weather permits, it may be forked over lightly, and in March levelled and raked clean, and afterwards beaten down with the back of a spade. The sowing may be in drills or beds 4 or 5 feet wide; if in drills they should be about 12 or 14 inches apart and ½ inch deep. The seed must be sown thin and covered with fine soil. When large enough they must be thinned and regularly weeded, or the crops may be spoiled. In hot weather they will need watering—a little soap-suds being useful, or thin liquid manure. When the tops begin to die, pull them, and if dry they may lie a few days, but the best plan is to let them lie a week or two in a dry room, and then tie them up in ropes, in which form they keep much the best. They do not like damp, but do not mind a little frost. Some persons grow very large onions by the method of transplanting, taking up small plants in September, or when they are about the size of peas, and keeping them dry through the winter, and setting them out in well-manured drills in February, 4 inches apart and 8 inches from row to row. The best kinds are Bedfordshire Champion, James's long keeping, Spanish White, and Tripoli. Of small kinds, Queen is the best.

Asparagus.—This is usually grown from purchased plants, seed taking too long a time to come to profit, and in purchasing it is infinitely the best plan to deal with a reliable seedsman, and buy plants three to four years old; a few extra shillings will be well invested. This plant requires the deepest and best soil in the garden, and one which has had its subsoil pulverised and manured. In preparing a bed, a trench of 5 feet wide by 2½ to 3 deep should be opened, and the bottom covered with broken tiles, bricks, stones, &c. Above this lay 8 inches of solid rotten hotbed dung covered with bone dust or ground bones. Next give the bed a layer of the following, well mixed together: two parts rich loam, one part leaf mould, and one part rotten dung, to which is added a dressing of sharp sand; fill in and let it settle to about 4 inches above the paths. The bed should be well exposed to the sun and not shaded by trees; it should be prepared from January to March. Plants should be three years old, and planted 15 inches apart each way, the crowns not more than 2 inches below the surface and the roots well spread out. In sowing seed drills must be made 15 inches apart and the seed sown 3 inches deep. When the plants are high enough they may be thinned to the required distance, but cutting cannot commence for three years, and even then it must be sparingly done. In cutting Asparagus a saw-edged knife should always be used, and care must be taken that in cutting the buds of other stalks

are not damaged; the cut should be about 3 inches below the surface. The first cutting should not extend beyond April and the second beyond May. Every year the beds should be heavily manured and the manure covered with the earth from the alleys, which may be thrown back in the spring. A good bed will last for 30 years. Giant, or Conover's Colossal, are the strongest recommended.

Celery.—The seed should be sown in February on a hotbed, pricked out in May or June on a bed of rich fine soil, and finally planted 6 inches apart in the trenches in July. These should be 4 feet apart, a foot wide and about the same deep, 4 inches of rotten dung being dug in the bottom. Sea-sand placed round the roots is said to keep off worms, but this we have not tried. Celery must never be dry, even the plants when out of the ground should be in water. The earthing up should not be done until 5 or 6 weeks before it comes in, except of the late crops, which will need it to help it to stand through the winter. The best kinds are Sandringham White and Matchless Red.

Rhubarb is a necessity in every country house, and every care should be taken to grow it, if only for its healthy properties, especially among children. Propagation is best made by planting eyes. Holes should be dug 3 feet deep by 4 square, and filled with vegetable compost and stable manure mixed, care being taken that the bottom is drained. This is firmly

trodden down, covered with a thin layer of light soil, and the eye of the plant laid so that it will be within 2 inches of the surface. February, if fine, is the best month. The plants should be 6 to 9 feet apart, no stalks should be gathered the first year, and when frost appears they should be covered with manure. The plants must not be allowed to parch, or they will be injured. Early gatherings may be made by covering the plants with a little manure, and old barrels over all. When it begins to flower, the part should be at once cut off, as the flowering spikes weaken the plants.

Cucumbers are favourites in every household, and a few words upon their culture will be useful. Hot-beds should be prepared as early in the season as may be convenient, and composed of fresh horse dung mixed with a little coal ash, and laid very lightly. The bed should exceed the size of the frame by about 6 inches all round, and be 3 to 4 feet high when it has settled. Place the frame on a couple of days after, and in another week 6 inches of good, rich, fine dry mould may be laid on it. The next day the seed may be sown about an inch deep and 2 to 3 inches apart. Too much covering of the frame is not desirable, as it draws the heat upwards and consequently expends it too fast. In four or five days the plants will show, when they should have a little air, but not much. Care must be taken to defend them from cold, and the cold steam hanging from the glass. If too much steam is

generated, give more air, or they may be killed if the sun is powerful. When the third leaves appear, transplant into pots or osier baskets, and, push them ahead in heat ranging about 65°, and always observing the fact that they must have air and moisture when they need it, they will grow famously. As they throw out runners, which should be pegged down, it is a good plan to pinch back the third or fourth joint of each plant. The fruit blossoms grow between the stalks and the leaves, the male or false blossoms at the joints. These are usually picked off as they appear, and are by some used to impregnate or fructify the fruit or female blossoms with the pollen. As they grow, care must be taken not to check them or starve them, and if it is desired to grow fine fruit, each should be placed in narrow boxes of the shape and size it is hoped the cucumber will be, but no fruit can be other than shapeless and bitter that is not regularly aired and watered. They grow much better in the shade than in the sun, which is only necessary to ripen, and in watering, which is best done in the evening, the water should not be fresh cold, nor poured upon the leaves or so as to expose the roots. Cucumbers are fond of an April shower, and grow very fast after it. For summer crops March sown plants may be transplanted in April on open ridges, and covered with a handglass until they are strong enough to withstand the sun and the cold nights. Any shoot that fails to show fruit at the first four joints should be pinched

off at its second bud, and this should be continued until it becomes fruitful, but as this pinching back often increases the number of shoots, care must be taken not to allow too many to grow. Among the best kinds of cucumber grown are Bluegown, Telegraph, and Duke of Edinburgh, but the latter are only suitable for forcing.

Marrows.—These highly useful vegetables should be largely grown in all gardens; they provide ample and delightful dishes all the summer, and may be stored for winter use with little trouble. The seed is raised in the same manner as the cucumber, and may be planted in ridges or on the top of manure heaps. Marrows are vigorous growers, and soon overrun a large bed, so that to economise space they may be trained over a hedge, a wall, or fence. The Custard marrow, though a handsome one, is not such a favourite as the Large Green, and Vegetable Cream, which have a more delicate and agreeable flavour.

Radishes may at almost all times be profitably grown, and are frequently tried as catch crops. They may always be sown in potato plots, and gathered before they can affect their growth. Beds of radishes too may be sown early in March, and protected by a little litter from the frost; successions may be put in throughout the summer, and got up in time for celery.

Lettuces are most agreeable in all households, and well repay the trouble of cultivation. The first sow-

ing may be in February, and continued until August, when a hardy kind should be sown, and transplanted in September to stand the winter frosts. It should be watered in the morning if the season is at all dry. For winter the bed should be under a north wall, and rich and light, and the plants set 6 inches apart. If handglasses are at hand another sowing may be made in September. Young lettuces may be ready for table by the end of March, if sown in old hotbeds in February, and transplanted on a weak hotbed under glasses. Transplanting helps the plant to cabbage, but the Cos needs to be tied up to enable it to blanch and form a fine heart. The best cabbage lettuces we know are Hardy Green, a good winter variety; Brown Dutch, a fine old lettuce; and Favourite, a summer variety. Among the Cos are Paris White, and Bath, both very fine.

Parsley needs to be sown about March, on a liberal soil, and the plants thinned when large enough.

Mustard and Cress is so well known that we need do nothing beyond mentioning and recommending its culture. All *herbs* should be sown in March unless slips or roots can be obtained. No garden should be without mint, sage, rue, thyme, marjoram, &c. Horseradish we would recommend not to be grown; it is a detestable root when once it commences to run, and is most difficult to eradicate.

Watercress can be grown almost everywhere, and if there are any streams or rivulets sufficiently clean

this delicious plant should be grown to perfection, but it must be remembered that it cannot be grown where ducks have access to it. The water should be shallow, and if running gently all the better, but a fast stream is not advisable. The plants may be laid at the bottom and covered with a thin turf, and they will begin to produce sprays about March in each year. It is best to pinch off the flowers as they appear. This cress may also be grown in shallow pits about 6 inches in depth if kept constantly wet, or it may be cultivated in shallow vessels of any description, with the advantage that it can be removed for the winter into frames or glass-houses, when it will be productive right through the year.

The Tomato.—This makes an excellent dish, and although it is so little grown by those who have not acquired a taste for it, yet it only needs cultivation and good cooking to prove it one of the most delicious fruits of the garden that can find a place on the table. Tomatoes are not hardy; they are chiefly grown under glass, but with a little trouble the plants will yield an abundant crop in a suitable position, and especially during a warm summer, as they need the sun to some extent to ripen them. The seeds should be sown in the cucumber frame in March, and not forced too much, or they grow tall, thin, and delicate. They are best if they can be hardened a little by degrees, and vigorous young plants may be planted out in rich soil against a south wall in the middle of May.

They are best grown in this way, staked or nailed to the wall as they grow, or they may be staked or pegged down in an open bed. Sun is all-important to them, and when the flowers are formed they should be exposed to it, and the shoots pinched back directly the fruit forms. The latter is best ripened on the plant, but it must never be allowed to stop until frost appears. The best mixture in which to grow tomatoes is one half reddish maiden-loam of an open texture, and one part each of hotbed manure and leaf-mould, the whole being well mixed the year before, and allowed to feel the power of the atmosphere in all parts. Some growers sow in pots and remove to a cooler temperature when the plants are 3 inches high, as they are not so liable to damp off. In turning out it should be in a ball, and in a portion of the prepared mould. In nailing up, room must be left for the swelling of the stems, and they should at first be trained fan shape and afterwards in a perpendicular form, all laterals being pinched off as they appear. About September, when the fruit is well set, the ends of each leader should be stopped, and the fruit will swell more rapidly and begin to change colour. Any fruit that does not ripen in time should be taken off with a piece of the stem, and hung up in a hothouse or warm room, and so long as it does not ferment it will ripen well.

Having thus referred to the principal crops necessary in a garden, we may remark that it should as far

as possible be used as a nursery for the larger crops on the arable. Those vegetables grown there need not be planted in the garden in the same form, but all plants of the cabbage tribe may be raised in the garden and transplanted on to the arable; the same with mangolds and any others that suggest themselves. The value of having at all seasonable times ample quantities of plants is immense, as every vacancy, every corner can be utilised, and in most cases the rows between potatoes can be set with one or the other. Cropping in succession must be rapid and perfect, and the yield will be much greater than in the ordinary way. Cabbage beds may be succeeded by turnips, which are always valuable among any kind of live stock, even though the house supply be ample. Onions—another saleable crop—may be followed by marrows, hardy cucumbers, lettuce, or French beans, and so on. There are rules without end, but the surest way to success is to cultivate well, give the plants room, permit no weeds, and never postpone a job for anything but weather. Bad land or heavy clay will always give trouble, but a determined man will make it grow, even though he has to pare the surface and burn it—a very capital plan on clay—adding sand and lime to make it friable and loose; but all operations should be done before the winter frosts appear. Frost is a fine fertiliser, but frost or snow buried or ploughed in do much harm.

The Orchard and Fruit Garden.—In these days

of fruit-growing, when so much is imported from the continent and far-off countries for British use, some readers may think it unnecessary to take any pains in order to grow their own, but we think a few moments' reflection will prove to any thoughtful, well-informed person, that although much is imported, all choice fruits are expensive beyond compare. Hence even should the sale not prove profitable, production for home use must do, unless the family go without. This species of self-denial, however, would be penny wise, for plenty of fruit not only assists the development of health, but is a great and delicious economiser in the house, reducing both butchers' and grocers' bills for a period extending through the winter should it be kept so long. At any rate no sane being can deny that fruit cultivation for home use is highly desirable. Whether a tenant is so far satisfied with the prospect of growing for sale is another matter, but he must upon close investigation please himself and plant accordingly. Apples naturally stand first in the list, and no one can deny that they are saleable at remunerative prices. In order, however, to sell well, the best kinds which stand the winter should be grown, and they will always return high figures. A purchase or two in different districts in winter of good eating apples will probably give some idea of value, and the same may be said of pears, but with good fruits of this description there will need to be some little labour in storing and protecting and in harvesting. All should be gathered by

the hand, that no bruises may result. Plums too are highly saleable and often yield well. In some years, like currants, there are such fine crops that prices are low, but they are seldom at such a low ebb that a fair price cannot be obtained. Our advice is, with respect to all small fruits, that instead of selling at low prices they should be preserved in bottles in the same way as those sold by Crosse and Blackwell. Bottles similar should be obtained and filled with the fruit, with about a quarter to half a pound of sugar (crushed lump) well mixed amongst it; they should then be corked down, waxed over or tied down with bladder as tightly as possible, as the air must be excluded. The bottles must then be placed up to the neck in a copper of cold water, and allowed to come slowly to a boil, remaining in it until quite cold again, when they are ready for storing. These turn out in winter almost like fresh fruits, and are most delicious. Cherries are generally in demand and sell well if good in quality, and as for currants, raspberries, gooseberries, and strawberries, it would be impossible to grow too many. They will always fetch a good price, and well repay a grower for his utmost trouble. In Kent we have been over fields of these fruits of acres in extent, and although we have heard complaints in good seasons of low prices, we know they often make high figures and always acceptable ones. Of course their culture must be of the best, and a maximum amount of fruit should be obtained from each plant. To this end, good

pruning, good manuring, clean cultivation, and the best varieties should be obtained.

Apples and Pears.—Should there be an orchard it ought to be overhauled by a competent person, and pruned if the season of the year permits. If there are any vacant spaces, trees should be planted in them. In the meadows, hedgerows, and all vacant and suitable spots, trees of some of the best kinds should be planted sufficiently far apart to prevent harm to the grass, and if this is begun at the commencement of a tenancy there will be an annual result, which considering the little amount of labour needed, will be handsome indeed. In purchasing, although it is well to go to a good firm in order to obtain reliable articles, yet the prices charged by such tradesmen are so much higher than good trees can be obtained for, that we should be disposed to advertise for what we wanted in one of the widest circulated papers, and obtain them for at least half the sum quoted by tradesmen. The writer has repeatedly done this, and will be at all times happy to advise persons how to proceed.

In planting fruit trees, as in so many other matters, every care must be taken to avoid wet undrained ground. One half of the withered looking trees in English orchards owe their want of vitality to water at their roots consequent upon unsuitable position or bad drainage. An orchard should be protected from the cold winds and incline towards the south. It should also have plenty of air, as a close low orchard

is more liable to blight and moss. The best soil is a strong loam, not too wet, and 3 feet in depth is the best. Great care must be taken to secure a dry bottom, or time will soon destroy the trees. Before planting (autumn to spring is the best time), the bottom should be covered with 6 inches of broken brick, ashes, stones, &c., and drains made if necessary to carry off the surplus water. When the trees are planted, some good cowdung well mixed with the soil should be used about the roots, which must never be planted deeper than is necessary for the tree to stand. Dwarfs may stand 10 feet apart (we speak of those which bear when about 4 feet high), but the trees usually though improperly termed dwarfs may stand 24 feet apart and the large trees 30 to 40. When firmly planted the trees may be watered, mulched, and tied with haybands to stakes. The spring following planting, steps must be taken to form the heads of the trees. A sufficient number of branches must be encouraged on each side, and if a branch is wanted to fill up, the requisite shoots should be stopped for the purpose. In the same way unnecessary shoots may be rubbed off. Should the leading shoot be broken off, a lateral must be tied, to grow in its place. The next autumn prunings should be undertaken with the same object, and so on yearly, but no leading shoot should be shortened. When in bearing condition too much young wood must not be retained in the interior, or sun and air will find no admittance.

A weakly or ugly tree should be cut down to within a foot of the end of each main stem, and in the case of an old tree which fails to bear, the roots should be examined, any perpendicular roots cut off, and the remainder dressed with rotten cowdung and rich loam, the tree itself being well sprinkled with strong soap suds and afterwards dressed with weak lime water. When the fruit begins to swell, it should, if the crop is large, be thinned, this proceeding not only enabling the fruit left to attain a larger size, but encouraging the development of fruit buds for the succeeding year. It is always wise to water the trees with manure or pond water just before the blossom opens, or in dry seasons it may drop off; the watering may be continued as the fruit swells. It has often been noticed that trees which have been planted many years have made no progress, but a close examination proves that the planting was improper. Sometimes the roots are placed deep in a clay or high up in a light soil, whereas the planting should have been *vice versâ*. Again, the roots must not be cramped, but a hole dug large enough to allow them to grow in lateral directions; the yellowness of the foliage or shrivelling of the bark will tell when the roots have too much water, and the drooping of the leaves is a sign that it wants water.

Sometimes hares and rabbits attack the bark of fruit trees. To prevent this, a composition of tallow and soot melted over a slow fire and laid on with a

painter's brush in a warm state is a capital remedy. In training young dwarf standards it is a good plan to reduce the shoots on the young plant to three, shortening each to 3, 4, or 6 eyes according to their apparent vitality. The next year the leaders should be reduced to six, shortening them again and spurring the remaining shoots. This system should be continued until the standard has reached a convenient size. Every branch should be formed into a mere bearer of front buds from the main leader to the extremity. Espaliers may be managed in a similar manner, having regard to their shape. Right and left shoots only must be encouraged and retained as fruit bearers, all redundant shoots from these being cut back at each pruning.

The three principal apple-growing districts in England are Devon, Hereford, and Kent; the latter county producing very fine fruit for the London market, Devon growing chiefly for cider manufacture, and Hereford for both cider and market. Yet fine as is the fruit, it does not obtain fair competition owing to the system of dealers and middlemen who swallow so much of the profit, but any grower who by his own energy can sell without the interference of these individuals must at all events make a handsome profit upon his orchard. Supposing he plants twenty acres; allowing forty trees to an acre the annual value of his 800 trees would be at least 200 guineas when in respectable bearing, and very much more when full

grown and in a good year; whereas, if he is able to store them with safety he would almost make his own price in the winter. Then it must be remembered that he has the grass for his cattle, or if the land is of the right sort he can grow roots or corn at his will, bearing in mind that arable cultivation would vastly improve the quality and yield of fruit.

Among the best varieties of apple are Sturmer Pippin, Ribstone Pippin, Hawthornden, Nonsuch, Quarrenden, Nonpareil, Russet, Irish Peach, Blenheim Orange, Orange Winter Pearmain, Orange Pippin, King of the Pippins, Lord Suffield, Colville Blanche, Fillbasket, Maiden's Blush, and Bedfordshire Foundling, the last six varieties being kitchen apples.

Pineapple Russet, one of the best dessert apples known, taking its name from the resemblance of its juice to the pine. It does not keep well.

Red Hawthorn, an abundant bearer and good cooking apple, keeps to January.

Scarlet Nonpareil. A rich juicy apple of yellowish flesh, a fine dessert variety, keeping until March.

Maiden's Blush is white, tender, and full of juice. It is a large apple, very handsome light yellow skin blushed with red. It is a fine bearer, but does not keep beyond October. It is a favourite for both dessert and cooking.

Orange Winter Pearmain is large and handsome, with a yellow skin. It is a fine apple for any purpose, bears well, and keeps until March.

Ribstone Pippin is a middle-sized, yellowish skinned

apple, with a russet hue, except on the sunny side where it is a marbled red. It is firm, yellowish, and of famous flavour. It is a great favourite either for dessert, cooking, or cider making, and keeps till March. The tree trains well and bears fairly on a rich loamy soil.

Bedfordshire Foundling is a fine kitchen apple, firm, sweet and very juicy, a highly valuable fruit for the oven. May be used from November to January.

Colville Blanche, a general favourite, as it is suitable both for dessert and kitchen. Fittest for use Christmas to April.

Coe's Golden Drop. A small dessert apple which retains its juiciness and flavour late in the spring. It is best when the skin has shrivelled.

Devonshire Quarrenden. A very delicious, productive, and handsome fruit. A splendid dessert apple in the autumn, when it is generally found in great abundance on the trees.

Irish Peach is one of the best autumn dessert apples, and is a fine bearer.

King of the Pippins, a hardy pear, very productive, medium size, handsome. A winter dessert apple, keeping till January.

Orange Pippin. Yellowish in the pulp, a beautiful fruit and a splendid dessert and good cider apple. Keeps till January.

Among the best pears are Duchesse d'Angoulême, Jargonelle, Bon Chrétien, usually called 'Williams,'

Autumn Bergamot, Chaumontelle, and Brown Beurré, but there are so many kinds that it is always worth while making enquiries before deciding as to the kinds that thrive best in the district, how they keep, and so on.

Fruit should be gathered in the cool of the morning of a fine dry day. Its ripeness is generally ascertained by its colour, odour, or, what is more correct, the readiness with which it leaves the tree. A light basket should be used, and each fruit gathered singly without squeezing, and laid, not dropped, in the basket, as in the case of keeping the slightest bruise will cause the fruit to turn bad before very long. If intended for winter or spring use, there should be a room set apart on purpose, with plenty of shelves, and the apples and pears may be laid upon a thin bed of straw upon these, and covered with another layer, and if sound the keeping sorts will stand the winter all the better for being gathered a little before they were ripe, if the temperature is not variable and too cold. It is a capital plan to heap the apples for ten days in the fruit room, that they may sweat before laying out on the shelves. Each fruit must be wiped dry and periodically examined, and the rotten ones removed. For keeping, damp is worse than frost. Some persons pit their apples in the same way that we have described for potatoes, and if properly done they keep very well, although when the pit is opened they go very rapidly. Apples and pears may be kept good

for a year in layers of fine baked sand in jars, so laid that the fruits do not touch each other. The jar must be tied down to completely exclude the air.

The Plum is one of the chief fruits grown in France, whence we import so many in the dried form. The French have a large number of varieties, but, with them, as with us, the Greengage (Reine Claude) is the chief dessert plum. In addition to cultivated varieties, we have in England the Sloe, the Bullace, and the Damson growing wild, the two latter being valuable, and well repaying the trouble of cultivation. Plums are not very particular as to soil, and do very well in anything which is not extreme, either complete sand or the stiffest of clay. The best plan is to buy ripe trees of the best varieties, whether for standards or walls, and train them well; the latter in the fan shape which suits them best, as the finest fruit is produced on the young wood, consequently a little must be produced annually. Standards do not need the knife so much as trained trees, but care must be taken that they do not grow too thick in the centre. The best kinds are:—

Greengage, which ripens in August, got its name from an unnamed plant which was received by the Gage family from the Jardin Chartreuse. It is healthy, fit to train in any form, makes a fine standard, and is a most prolific bearer, more so indeed when old than young. It needs thinning when grown on a wall; the only fault of the real Gage—and growers must

beware of spurious French imitations—is, that it is liable to crack during wet weather.

Orleans is one of the best and most prolific plums known, it is much recommended for the kitchen, and makes a splendid dish for dessert. It ripens about the middle of August.

Purple Gage ripens early in September, and is similar in shape to the Green-gage. Its colour is purple, and it is a profitable plum for market.

Golden Drop (Coe's), a well-known delicious fruit of very large size. It is oval and yellow with red spots on the outside. It is juicy, and very fine in flavour. Its growth is most vigorous, the fruit abundant, so much so that it requires thinning. It ripens about the end of September.

Magnum Bonum (Red), long known as Imperial, ripens just before the last named. It is large oval and deep red, with a fine bloom, but not so juicy; it is however a splendid plum for preserving.

Magnum Bonum (White), often called the egg plum, is very largely cultivated, and a great favourite in the kitchen as well as for dessert. It is very large, oval, and yellow. The tree is a fine bearer in any form, and requires plenty of room.

Imperatoire is a favourite fruit of dark blue colour, heavily covered with bloom. It is medium sized, oblong, and very rich in flavour, a good bearer, and tolerably vigorous.

Victoria, Jefferson, and Duke of Edinburgh are also first-rate plums.

The Gooseberry is an old English fruit, which is largely cultivated, but its treatment is as a rule so unskilful, that not more than one-half the fruit is obtained from the trees, and that an inferior size, which they are capable of bearing. A cutting should be taken off close to the parent branch, and shortened to nearly one-half its length. It should be put about 3 inches in the ground, not pressing on the soil, which, however, should be firm around it. As it sprouts in the spring, encourage the upward growth by rubbing off all the bottom buds, and in the autumn prune it by cutting off the top, leaving it 12 to 18 inches high. Again the next spring leave the three uppermost well-placed shoots and rub off the rest. The growing leaders should be trained horizontally, forming a triangle; a stick or two will keep them in position. Side shoots will appear next, and these in the autumn may be cut down to half the length and 5 inches apart; and those not needed for the formation of the tree are cut down to one bud. The ends of the leaders will need nipping off; and all superfluous growth in the centre should be cut away. This process will result in a strong, well-formed bush, able to grow fruit for exhibition; but for this purpose severe thinning is necessary. Autumn pruning is the best in future, and all new growth upon the last year's must be cut right away in every succeeding season. The succession of young

and vigorous shoots will produce good crops for several years; whereas, fruit grown upon the old wood is usually small. An over-grown tree should be cut back close to young shoots. It is the practice with some to prune the roots every three years, but the writer has never tried this method. Manuring is very necessary; and good rotten cow-dung should be placed in a little hollow around the tree and covered in. The gooseberry does best in a strong loam, especially if the subsoil is gravel. The best kinds grown are the following, selected from a list of 250 varieties. Keen's Seedling, Thumper (green), Warrington (green), Criterion (yellow), Champagne (yellow), Hairy Raspberry (white), King of Trumps (white), Warrington (red), London (red), Wonderful (red).

Currants are usually grown in bushes, on borders, or in beds 6 feet apart, so that crops can be taken between, but we prefer to save this vast occupation of ground, and grow them against walls or fences, where they are quite as productive, and fill spaces which would otherwise be lost. They may be planted for training 2 feet apart, and the leader grown perpendicular with one another on each side, forming a tree something like the head of a three-pronged fork. All the shoots should be pruned back and the fruit grown upon the numerous spurs. These little trees may be planted between wall pears, plums, &c., and on large premises many hundreds can be cultivated with great

success. The best sorts are the Black, Red, and White Grape, Jackson's Mammoth Red, and Black Naples.

Strawberries do best on new soil, on which they have not been grown for some years; it should be rich, deeply cultivated and heavily manured in the autumn, and left so that when planting it is slightly stiff. Planting is best in July or August, the plants being 2½ feet apart, set 2 inches deep, and tread them in firmly: if they have a little ball of earth at the root, so much the better. A little rain will then do good, and nothing more is needed but the hoe, though runners must be prevented growing. Strawberries should not be allowed to grow too long on one spot as they impoverish the soil, and do not crop at all well without very heavy manuring. Another plan is to ridge and manure land which has borne potatoes the previous year. The ridges should be 2½ feet apart, well rolled, and the strawberries set 18 inches asunder on the ridges. Weeds are kept down, runners not allowed to grow, and the plants cropped for 4 or 5 years; when they are taken up, the ground is cropped with potatoes again, and planted afresh as before. Plenty of manure secures plenty of fruit. In taking runners, it is a capital plan to take a number of small pots filled with rich soil, and lay one in each, and when fairly growing it may be severed from the bed, and is ready for the next year, or if necessary for forcing. Perhaps there is no bed so difficult to keep clean as the strawberry bed. Where the plants are grown on

ridges or little hills, it is a very capital idea to use tanner's bark, laying it between the plants tolerably thick, but not within a few inches of the plant itself. It has a protecting influence, it kills the weeds, prevents the exuberant growth of runners, keeps the fruit clean, is objectionable to slugs, and moreover does no harm whatever. The best kinds grown are: British Queen, Dr. Hogg, Keen's Seedling, Sir C. Napier, and Alice Maud.

Raspberries, which are often found wild, are greatly improved by cultivation. They like a nice light loam, well manured with stable-dung. In making a new plantation, young and vigorous suckers should be planted out in September, in rows 5 feet apart each way; the following year, all the shoots but four should be cut down—these four being trained in a slanting direction on each side of the tree, so that an opening is made for the young suckers in the centre. Too many must not be allowed to grow, or the fruit will be small. In November they are again thinned, and only nine or ten of the strongest left. These are cut at their heads, and trained as above. When the trees have borne four years, the best suckers are taken for a new plantation, to come in bearing when the old ones need a succession. The Antwerp red, yellow, and white, is a good variety, Carter's Prolific is a good one, and Semper Fidelis, the heaviest cropper known. The Siberian, or Double-

bearing, is a favourite, as it bears in July, and again in October.

Cherries are favourites in most gardens, but not such certain croppers as some fruits. They are, too, so largely attacked by birds, that we cannot strongly recommend them to be grown for profit. A few standards may be grown for home use, and selected from the following: Bigarreau, Blackheart, Late Duke, and Morello. The latter grows almost exclusively on the preceding year's wood.

Grapes are a variety of fruit which are exceedingly profitable in the hands of a person who can master them, and who has plenty of glass. Under such conditions, we know of nothing more profitable, but it must be remembered that they demand constant labour, and unremitting attention. We have, however, merely to deal with hardy grapes, such as may be grown with little trouble upon walls which would in all probability be otherwise left bare. The usual objection to out-door grapes is, that they don't ripen in this climate; but we do not consider the objection tenable, inasmuch as it is not the temperature so much as the variety of grapes grown; and if a suitable grape is grown, we can see no reason why every south wall, and every cottage porch, should not be ornamented with glorious clusters which would add so much to the pleasure of the occupants. The chief thing in planting is to procure a suitable composition or the sustenance of the vine, and when the spot in

which it is to be planted has been drained—the drain being a large one, and covered first with clinkers, stones, &c., and next with vegetable refuse, to prevent the soil from getting through—a quantity of earth which has been taken out should be replaced by the following mixture :—Light yellow loam one-half, leaf or vegetable mould, one quarter ; and horse-dung one quarter. A few ground bones are useful, if they can be had. The depth of soil should be 3 feet, and the width of the border as great as can conveniently be made. During the first season the vine should be allowed to grow as freely as it will until the pruning season, when weak shoots are cut down, and the others shortened to three, five, or seven buds, according to their vigour. The second season, the leading shoots should be allowed to run as high as they will, the side shoots being stopped at the third and fourth joint, all laterals being stopped at the first joint. If any bunches appear, pinch them off, and the third year cut down again to about eight or nine buds from the previous year's cut. Side shoots are cut through at the second joint, leaving only a single bud to each spur. The side shoots will now show fruit, and 6 or 8 bunches are left on each vine according to their strength, the shoots being stopped one joint above the bunch. In the next and succeeding years, the pruning is managed in the same way, when fruit will show in great plenty, but too much should not on any account be left on, or the vine will be weakened

and the fruit inferior. Young shoots can by degrees be trained in the same way as the old, until the vine covers the whole of the space allotted to it. The best varieties for cultivation are Walton Hall, Frotignan, White Orange, Sweet Water—all these are white; also Hesperion, Black Prince, and Burgundy (black).

Filberts are productive, the nuts selling well at all times, hence they should be encouraged in odd corners, and in shubberies where they can get light and air. The best bushes to plant are those which have been set out for two or three years, to gain strength and form. They may be planted in rich soil, a little manured, in the Autumn. Each one should be pruned so as to leave an upright stem of 3 feet, so as to form a good bush. In Spring this stem is cut down one-half, half a dozen of the best shoots only being allowed to grow. The ends of the shoots are grown upwards, care being taken to keep the centre of the tree open, and forming a hollow; the shoots grow into branches of 4 to 5 feet, and at this they are kept, all lateral shoots being cut back to 3 or 4 inches. As many spurs as may be should be encouraged, these being the most productive. All suckers must be cleared away, and thus, by proper use of the knife, all the strength is thrown into the production of fruit, which will continue for half a lifetime. Be careful to plant only the finest varieties, but before deciding upon growing nuts, see that there

are no squirrels, as the writer usually loses all his filberts before they ripen, preferring not to destroy the amusing little thieves.

One or two Walnuts, Quinces, and Medlars are useful for variety in every garden, needing nothing more than a fair soil, free from excessive wet.

CHAPTER XVII.

MANURES.

Farmyard—Guano—Soot—Salt—Lime—Bones—Nitrates of Potas and Soda — Gypsum — House soil — Mould system — Vegetable mould—Refuse—Manures for Grass—Burned clay.

No subject can be more interesting to anyone contemplating, or practising the growth of cereals or roots, than the science of manure, if treated in a homely way. Indeed, a knowledge of the relative values of the ordinary manures used is essential, and in many cases the only road to success; bad land will not yield a crop at all without their aid, and good land will soon become exhausted for a similar reason. We have therefore devoted a chapter to the subject, not saying all that can be said, but as much as is necessary for all practical purposes upon a holding such as that which it has been the object of this book to sketch. Farmers to-day have universally learnt, that in order to obtain a maximum crop from the land, they must first of all feed it with suitable food. If a corn crop is needed, a manure containing the food upon which the corn plant feeds must be sup-

plied in proper quantities; although we have met persons who believed that any kind of manure was suitable to any plant. We may take man as an illustration. If he is a labourer whose work lies in the fields, he may be advantageously fed upon hard cheese, or pork; but supposing him to be a clerk or mechanic, whose occupation is sedentary, it is a thousand to one that these foods would cause indigestion, and unfit him for his work. The food then, as the manure, must be suited to the plant, and given in proportion to the return we expect from it.

The principal manure used is that made in the farm-yard, but its quality varies in accordance with the food which the animals have eaten. We are told that the sole application of farm-yard manure to soils results in their gradual exhaustion, inasmuch as it contains so much less of the necessary phosphates and nitrogen than is withdrawn in the crops; yet it is very necessary, inasmuch as it assists not only in enriching, but in warming and ventilating the soil. Admitting that it has value, and high value, as a fertiliser, all who make and use it should devote every effort to protect, improve, and keep it, for it deteriorates by contact with the atmosphere and is diluted by rain. As it is, nearly one-half the manure made on all farms is wasted, and the result is, that the crops are so much poorer, or the tenant has to dip so much deeper into his pocket for artificial. The following remarks from the 'American Agriculturist' are pertinent.

'When properly littered, one cow or ox would make a ton of manure every month, if the liquid as well as the solid portion is saved. Ten head would thus make 120 tons, or sixty two horse waggon loads, in a year. A cow is believed to void 2,000 gals. of urine in a year. This contains only 65 per cent. of water, the balance being composed of lime and potash. A pair of horses will make as much manure as one cow, or twelve tons in the year. A hundred sheep, if yarded every night and well littered, will make 100 tons of manure in the year, and ten pigs will work up a waggon load in a month, if supplied with sufficient coarse material. The stock of a 100-acre farm—which would consist of at least ten cows, ten head of steers, heifers, and calves, a pair of horses, 100 sheep, and ten pigs—would then make in the aggregate 315 tons of manure every year, or sufficient to give 12 tons per acre every fourth year. If this were well cared for it would be, in effect, equal to double the quantity of ordinary manure; and if plenty of swamp muck could be procured, at least 600 tons of the best manure could be made upon a 100-acre farm. If this were the rule instead of a rare exception, or only a possibility, what a change would appear upon the face of the country, and what an addition would be made to the wealth of the nation!'

The best method of applying dung, is to cart it in the land before it is ploughed: the first time it is laid in regular heaps, and spread evenly, so that it can be

ploughed in and well incorporated before the spring sowing. It is always best to cart manure during hard or frosty weather, especially on heavy land, which otherwise would be made more heavy still; and on apprehension need be felt about it losing value by exposure, as this fallacy has long been exploded. As a general rule, it is best to use rotten and heavy dung to light land, and stable and new farm dung to heavy land, the latter allowing the air to penetrate into the soil, mellowing and lightening it. Where the manure made is especially good, it is a capital plan to save it in a big trench, made for the purpose, and either bricked, asphalted, or made with a hard bottom and sides of beaten earth. The manure should be wheeled, liquid as well as solid, into the pit, and regularly covered with earth. It will increase in bulk to nearly double the extent, and as the gas and liquids will not escape, it will be quite equal in value, the earth fixing both.

Guano is one of the strongest and most valuable manures known, but it is at the same time one of the most variable in strength. It is much richer than soot, and used in much smaller quantities, helping the plants almost directly; hence it is very suitable for most poor soils. Mr. Mechi says it is in many instances fertilising, in others exhausting, supplying phosphates to grain crops; but being deficient in potash, is, used alone, unsuited to root crops, unless the land is rich in alkalies. It is for

these inferior to dung from animals fed on roots, hay, and cake; but most suitable for application in the land where these are drawn off. Guano has the best effect on land rich in potash; therefore, we have another proof of the value of knowing the composition of the soil: for if deficient in potash, money spent in this manure may sometimes be thrown away. As a grass manure guano is very valuable, giving a far greater yield than any other, excepting nitrate of soda and sulphate of ammonia. For this purpose it is best used alone: 2 cwt. mixed with 25 bushels of ashes, and sown in February, during rainy weather, giving a very marked increase in the yield.

Guano may be tested by mixing with lime, when it will emit strong ammonia, if it is a good sample.

Soot is now very largely used by farmers as a fertiliser, more especially as it is valuable upon all soils, and suits almost all crops, garden as well as field, more especially after thinning. It contains 10 parts of moisture, 45 of organic matter, $3\frac{1}{2}$ sulphate of ammonia, oxides $15\frac{1}{2}$, 11 sulphate of lime, 1 carbonate of lime, silicates and silicious matter 11, chloride, &c. 3 parts. Soot is generally used as a top dressing, and if it can be sown round the stems of the young plants, all the better. With some crops, such as potatoes, mangolds, turnips, and those which are sown in drills, it can be sown at the same time with good effect.

Salt.—A deal of varied opinion has been ex-

pressed, at different times, as to the merits of salt as a manure. Our opinion is, that it is not so much a manure as an agent which destroys, or nullifies certain elements and combinations of matter, which are otherwise not available or able to enter into the composition of the plant. It is also supposed to benefit the subsoil, and when mixed with dung, greatly assists in the destruction of worms. Salt is valuable on light land, as it attracts moisture and makes it more firm. It is an enemy to the wire-worm, and is much used in conjunction with guano, especially for mangolds, as it enables the potash and phosphoric acid to become available. For pastures, salt is also valuable, as it improves the quality of the grass, which is eaten with greater relish.

Lime is very often valued in an improper sense, and treated as a manure pure and simple, whereas its value as a dressing for land is as a medium through the action of which some substances are enabled to become useful to the plant, and others which are injurious are rendered harmless. It also assists in the decomposition of other matter, which thus becomes food for vegetable life. There is nothing actually fertilising in lime itself; for it is simply chalk combined with fixed air, yet it supplies the deficiencies of both sand and clay. On weak clay or impoverished land, a dressing of lime has a marked effect, for it attracts something from both earth and air, which but for it would remain in a dormant

state; yet a second application of lime, without an ample addition of manure to supply the loss occasioned by the exhaustion of the power discovered by the lime, would result in failure or a diminished crop. Upon drained bog or marsh land, deep, dry, and rich loams, it is effective, as these generally contain a quantity of those substances upon which it is adapted to act; and the loam especially is often so sluggish, that without the rousing given by the lime, the rich portions of its composition often fail to become active. Clays bear a repeated dressing of lime better than lighter soils, and largely increased crops have been known when it has been applied hot from the kiln. It also is believed to have a preservative effect in wet seasons, for corn grown upon limed land has a more healthy appearance than the more sickly crop upon land which has not been limed. Upon sandy land lime combines with the minor particles and attracts moisture from the atmosphere, thus giving more solidity and consistence to the soil, enabling it the better to withstand drought. The addition of clay is, however, advised with the lime, as the latter sometimes unites with the sand in a mortar-like form, and consequently becomes deleterious.

Bones are considered to be of great value as manure, more especially on light land, where they are considered superior to farmyard dung. Their fertilising properties, suitability for drilling, and condensed form render them a great assistance to the

farmer. On light soils they show an immediate result, and likewise benefit the whole rotation. On peat, limestone, and loam they are beneficial, but on clays little benefit results. The dust is either drilled in as with turnips, or sown broadcast at the rate of 20 to 25 bushels per acre. Sometimes crushed bones are used instead, as these have a more lasting effect upon the land. Turnips, especially on very light land, benefit more than any other crop from bone manuring, and if the dust is mixed with an equal quantity of sheep dung the effect is almost as good, with a great saving in cost. Grass, however, is materially benefited by the use of bone dust, which is applied very largely to exhausted pastures. Dissolved bones have been very much used under the name of superphosphate, as in that state they have a more immediate effect upon the crop, and although later discoveries have caused bones to be less used than they were, yet the nitrogenous matter they contain gives them great advantages which are not held by other forms of phosphate. Dissolved bones should contain about 20 per cent. of water, 25 of gypsum, 37 of phosphates, 5 of salts, and the balance of organic matter. Expense is clearly saved by the use of superphosphate as against bone dust, and it may be prepared by adding 1 bushel of bones to 1 stone of sulphuric acid.

Nitrate of Potash (saltpetre) suits light soils the best, and is a good top dressing for grain and grass crops. It is very effectual in destroying vermin.

Nitrate of Soda also suits dry light soils, and is a capital manure for oats and grass crops.

Gypsum, which is a calcareous earth in combination with sulphuric acid, does not suit heavy or damp lands; it is more suitable to chalky or sandy soils. It is a good dressing for artificial grasses, if pulverised and strewn at the rate of 4 to 6 bushels per acre before or during a shower.

House soil, &c.—The late Mr. Moule was the first to bring this powerful manure prominently before the public, and convinced of the truth of his theory, and the subject being a *bonâ fide* one, he did a great amount of good. House soil, if collected on the earth system, entirely prevents all smells, bad drainage, and cesspools; and mixed with fine earth and allowed to dry under a shed, it quickly becomes absorbed into the mould and is ready for use again. Indeed it may be used in the closet over and over again. As a manure it becomes of course more powerful after each operation, and should be used accordingly. Setting aside for a moment the question of manurial value, the author counsels every reader to forthwith adopt the earth closet system. In an outdoor closet, let the pit be emptied and well mixed with mould for going on the land, cleanse and lime it, cover it over with boards on a level with the floor, and place a couple of large zinc pails of oval shape, one under each seat. A box for the dry mould with a small scoop with which to sprinkle it

over the excrement, and the thing is complete. These pails may be emptied when necessary and replaced. Some persons retain the pit, which is periodically emptied from the back; and the earth preserving cleanliness and freedom from smell, the operation is never a disagreeable one for workpeople. In the house the pails may be used in the same way, the old pipes being stopped, and the pan and machinery removed. Wherever there is a garden, all the house soil and drainage should be retained, well mixed with *dry* earth that none of its properties may escape, and annually applied to the land for cropping. For onions, beans, peas, roots, potatoes, and cabbage, it is an admirable manure, and may be either drilled, dibbed, or sprinkled broadcast in quantities consistent with its strength. Stable and cowhouse urine should be collected and treated in the same way, unless used as a liquid manure.

Manures for particular Soils.—Cold, stiff, or clay land may be mellowed by the addition of one load of sand, one of rotten dung, two of rich turf earth, and half a load of seacoal ashes; to three load of the natural soil. This compost, mixed well and laid a summer in heaps, will be fit for use in the winter. Cold land may also be manured with the following. One load of the natural mould, two of rotten horse dung, one of sand, and one of chalk. These should be applied often and in moderate quantities to be effective. Loamy land requires different treatment.

If the subsoil is stiff, rotten horse dung and seacoal ashes mixed in even proportions will do well. For sandy or gravelly land: mud, pond, or ditch scourings, mixed equally with strong loam, to which a little horse dung has been added, will be best if the soil is very sandy. For light sandy land, marl is capital laid on at the rate of eighty loads per acre; if the soil is very poor and deep, double this quantity may be given. For gravelly or plain sand, clay is good if not digged in too deep. For light or sandy loams which want recruiting, give four load horse dung, two and a half chalk, two marl, one sand, and one of lime, well mixed.

Ashes are valuable and should never be slighted, those made from wood being the best. *Blood* is capital for any kind of land, and may be used to fruit trees with great results. *Sawdust* is also useful in a rotten state, especially upon heavy lands. *Vegetable mould*; a good method of preparing this is to collect at the end of the autumn a quantity of leaves, omitting oak and fir. They should be thoroughly saturated with liquid manure and covered with fresh stable dung; when the heat has subsided it may be opened, turned, and mixed, and again saturated with the liquid manure, the process being repeated until it becomes a fine mould. In order to prevent a waste of the liquid, a layer of fine earth at the base is desirable.

Garden refuse manure is often badly treated in its

manufacture. In all cases it is best to make two heaps, confining one to the trimmings of paths, weeds, &c. This heap should be burned in the autumn, and the other, composed of cabbage stalks, haulm of peas, beans, potato tops, clippings, and other refuse which does not contain the germs of future plants, should be laid in an open place and mixed with loam as fast as it is made, thus enabling it to decompose much quicker. The ashes of the first heap will always be useful, more especially on onion or carrot ground, and the compost when thoroughly rotten may be at once dug into borders which it will greatly benefit.

Manures for Hay.—Experiments as to the value of artificial manures in growing hay gave the following increase per acre to 1 cwt. of each manure :—

Manure	Cwt.
1. Nitrate of soda	6¾
2. Sulphate of ammonia	6
3. Guano	5¼
4. Sulphate of potash	2
5. Dissolved bones	2
6. Superphosphate	1¾
7. Muriate of potash	1¾
8. Farm yard	1½
9. Bone dust	¾
10. Sulphate magnesia	½
11. Gypsum	¼
12. Salt, a decrease	

The nitrate of soda applied at the rate of 4 cwt. per acre did better than when a less quantity was given, producing in fact ½ ton per acre more per

cwt. in three different seasons. If used with a similar quantity of mineral manure it yields still more largely. A very capital mixture is—

1½ cwt. nitrate of soda
1½ muriate of potash
3 superphosphate

Upon clay meadow Mr. Sheldon recommends 1 cwt. nitrate soda, 2 cwt. mineral superphosphate, and 3 cwt. kainite.

Mr. Lawes, who has made calculations as to the money value of manures produced from different kinds of foods, gives the following estimates:—

		£	s.	d.
Cotton cake . . .	manurial value	5	10	0
Linseed ,, . . .	,, ,,	3	19	0
Beans	,, ,,	3	3	0
Bran	,, ,,	2	18	6
Clover hay . . .	,, ,,	1	18	6
Indian corn meal . .	,, ,,	1	6	6
Meadow hay . . .	,, ,,	1	5	6
Oat straw . . .	,, ,,	0	12	0
Potatoes	,, ,,	0	6	0
Turnips	,, ,,	0	3	6

Burned Clay.—Upon cold stiff land there is nothing better than this as a dressing. It has a great and immediate effect, and too much can scarcely be applied. Mr. Meçhi, who is a great authority upon this question, says he put eighty loads per acre on at first, and his land never forgot it. In fact it may be burnt all the year round, having first been sun dried, and should not cost more than 1*s.* a ton. If the land is pared, all twitch and noxious weeds, and in-

sects, will be destroyed. Burnt clay not only imparts a lightness and freedom to the land, but it developes conditions favourable to the luxuriant growth of plants, which though present in unburnt clay are inaccessible to the constituents of air which should set them free, and it is consequently barren.

CHAPTER XVIII.

FENCES, HEDGES, AND TIMBER.

Hedges—Hawthorn—Crabthorn—Holly—Poplar and elder—Furze—Planting a hedge—Cultivation—Cutting—Formation of hedges—The ash.

Fencing.—Most occupiers of land in England have far too many hedges to please them. These not only occupy space which should be productive, but they harbour vermin and entail a great deal of labour and consequent expense. If it were possible to estimate the loss per annum per acre through the growth of hedges, we think the British farmer would open his eyes pretty considerably. We have frequently seen farms where the hedges to be trimmed and laid every year or two, measure miles in length, and if the hedger is paid at the rate of about 8*d.* per pole the expense of labour alone would, during a short lease, be enough to pay for permanent iron fencing. So many ditches are not necessary even on heavy lands if the drainage is good, and therefore, if there must be a fence, occupiers of land should strive to convert it into an iron one. As a rule wood can be had on the land, and a sufficient number of posts being

provided and set, having been previously well soaked in tar, stout wire should be strained, and if this is well done, and with the aid of a little machine which can be purchased for about 15*s.* (any smart workman can use it), it will last for many years, adding a great deal to the productiveness of the land, costing less for labour, and on an estate so fenced vermin will be at a discount. It would be necessary to have a fine wire fence to keep out pigs, sheep, and cattle, each wire being thoroughly well tightened, and the straining posts well braced or spurred to keep them erect. Useful wire can often be obtained second hand at half the cost of new. Some persons prefer whole iron fences, but although they are, if stout, handier, and last still longer, the expense when they are applied to a farm is very great. In all cases in which a purchase is made of new material, it is most advisable to obtain three or four quotations, manufacturers differing widely, and in one case we knew a gentleman who bought his own fencing at the maker's stand at the Royal Agricultural Show about 30 per cent. lower than the quotation which had been posted to him from the same firm.

Wooden fences are of various kinds. For most purposes a three-rail fence is useful, and can be put up by a handy labourer, the rails having been sawn out by a steam saw. They should be tarred, as they will keep so much longer. As a rule, quickset hedges

are protected by these fences, so that if well preserved the rails will do again when the hedge is able to do without them.

Hedges.—The *Hawthorn* will grow upon almost all soils, although it does not thrive so well as could be desired upon the poorest land. It is a good live fence, is noted for its longevity, especially if regularly and well pruned, and affords material for dead hedges. The *Crabthorn* will thrive better than the hawthorn on bleak cold and poor land, and it grows quicker. It is not, however, so admirable a fence as the hawthorn, not growing so bushy, nor is it so prickly and compact, though it produces finer stakes. The crab is often used where the situation is bleak and exposed, and seedlings can be easily raised, the seeds vegetating the first year. The *Holly* is perhaps the best fence of all, and will grow wherever a crop of corn can be produced. It is one of the strangest things possible that holly hedges are so rare; when we see one, it is generally impregnable, handsome, strong, and always green and warm. True it is a long time growing, but there is nothing difficult in its management, and two or three years longer make little difference in point of time in the lifetime of a permanent hedge. Holly, though it will thrive well by itself, does better if it is grown under a hawthorn or crabthorn; the latter for choice. It should not be planted in the spring when the thorn is planted, but in the summer season. No hedge is so good for the

protection of cattle from biting winds and drifting rains, or for the protection of a garden. In swampy and wet soils, which do not well suit the hawthorn, nothing is better than the *Black Poplar* or *Elder*, the latter being more bushy in its growth, and both if well pruned will branch out to the ground. *Furze* is a capital protection to young quick; it is not long in growing from seed, and is handy for the protection of cattle. It provides fuel for the house, and if chaffed or masticated is an agreeable food for stock. Furze seed may be sown in a drill from a bottle in which is a cork and quill, and then covered over lightly with the rake, the drill being left somewhat open to receive rain. The French furze is the best, as the seeds do not mature and spread so much as the common furze; one pound of seed will be sufficient to sow 200 yards at least.

In planting a hedge the general custom is to dig a shallow ditch and lay the plants in a leaning position against the first spits turned out of it, covering the roots with the second. The ditch should, however, be suitable in depth to the soil, and no custom followed which has not the currency of common sense. Where a deep ditch is made, care must be taken to place the top mould round the plants; but in some districts no ditch at all will be necessary, and the quicks will be all the better planted on the level ground, especially on high or stony land. In this case the soil should be well cleaned, and if

necessary cropped before planting. Potatoes or turnips would do very well. The plants should be set from four to six inches apart, according to their age and size, the best season being the spring. In raising a holly hedge under quick, the best plan is to sow the berries when planting the quick; or if more convenient, plants may be set the following midsummer, this being the surest plan at least. They may either go between the quicks or in front of them. It is a good plan in making a hedge to plant young oaks at about every couple of rods, dibbing two or three acorns around each to guard against accidents. Timber growing is, however, a landlord's matter.

When the hedge is set, it must be borne in mind that it is not by any means made; it must for years be kept clean to enable it to grow, and be well trained into shape. Quicks cannot thrive if docks, nettles, ferns, or thistles are numerous, nor where sheep, or even hares, can get a nibble. The safest guard, therefore, is a good, well sloped three-rail fence, as before mentioned. When the hedge is strong enough to prune, it must be carefully done, the bottom being left the fullest, tapering upwards, and by no means cutting off any of the leading shoots. Good pruning will produce a strong hedge in four or five years less time than will bad pruning, and even then the hedge under the latter management will be ugly and less effectual. A holly hedge should be trained upwards, its sides only being trimmed, and a condition of thickness

promoted which prevents animals seeing through. A hedge should not be cut until it is four or five years old, and then it should be well pruned in spring, winter suiting the hawthorn best. It should be borne in mind that whether a hedge needs pruning or not, it should be cut down close if weak or diseased or growing in bad form, unequal, mossy, or full of gaps. In all probability this will do it good. In some parts it is simply laid and staked, in others ash rods are used to form the top of the laid fence, wound in along the stakes, and termed 'headers.' In other parts the hedge is cut right away, and completely artificial fences made with stake and header. A good live hedge is made by cutting away the strongest stems and shortening the others which are interwoven with the slender ones, the live stakes being supplemented where necessary by dead ones, and the whole finished firmly with headers. Care must be taken not to spoil such a hedge; the stems laid should be just nicked with an upward cut of the bill, or the rain will be conducted into the wound, although any that will lie without breaking or cutting are better for it. If any gaps appear which have no live wood contiguous, stakes must be driven in and the nearest young shoots laid between; this should be kept low to give it every chance. All hedges are better for an annual trimming on the sides and cleaning at the roots. The spear thistle, a biennial plant, is one of the worst enemies to a hedge, and if

cut down before seeding it is extirpated. In large gaps it is the practice to plant fresh quicks, and fence with the three rail. If a hedge is old and worn out, it is advisable to consider whether it should not be grubbed up and a wire fence raised in its stead, or whether a new quick should be planted; any way, directly it shows signs of uselessness, prompt steps should be taken. Hedges should not be allowed to become clogged up with timber, and when trees have grown sufficiently large they should be cut down. We do not like to see large arms or branches taken off of fine trees; they often damage the trunk, and fissures which are left retaining water and further aggravating the large wound. Limbs cannot be taken from fine trees with impunity, and although shoots and small branches may be cut from all species of trees, yet the amputation of a limb is a serious attack upon their vitality. If, however, such a thing is necessary, the limb should be taken off above the first shoot, which if left will draw up the sap and assist in preserving life, especially if the end is well smoothed so that wet cannot hang. Boughs growing from limbs may at all times be cut with safety.

Ash.—We once read an essay on the profitable nature of growing ash, in which most desirable results were shown, which we quote. But having grown it ourselves, though certainly not under similar conditions, we are able to state that the result would not, if

properly averaged, have paid the rent and expenses. The writer we quote says the trees should be planted 4 feet apart each way, and if for underwood 2 feet apart, and less in the rows, every other plant being taken out in six years, and the rest in ten, to make hop-poles. Thus an acre is estimated to yield over 250*l.* for poles alone, and nearly 100*l.* for hoops from the first cutting, the faggots paying the labour. Against this has to be placed rent, fences, &c., which if estimated at 10*l.* a year leave a large profit. If timber is desired later on, a pole should be left about every 3 yards. The ash is easily cultivated and managed, and although it is undoubtedly profitable under the most favourable circumstances, we cannot believe that anything like the production above named could be expected.

CHAPTER XIX.

HAY AND HAY-MAKING.

'MAKE hay while the sun shines.' No proverb proved more profitable during the past rainy seasons. Dilatory farmers in many cases made their hay in the rain, and it was consequently spoiled; others, shrewd sensible men, who never lose a chance, put double strength to work when the sun favoured them and saved their crop. In cultivating hay it must be assumed that the land is well drained; otherwise crops can never be satisfactory. Anyone taking land which is not drained, or inefficiently so, had better therefore, set about it and get it done at once. In case of undrained land an arrangement can generally be made with the landlord, but, failing his help, a tenant with a long lease of a small holding would be very wise to do it at his own cost rather than leave it as it is. The cost would not exceed 3*l.* per acre. Commencing a tenancy at Lady Day, the first thing is to examine the land and discover what it is necessary to do. The fences should be put in order first of all. If hedges, they should be cut into form and gaps

stopped ; if fences of wood, any repairs must be made. Such jobs as these must be done by the house staff, but if the fences are laid quicks, an experienced hedger will be required. Such a man will usually work for 15*s.* a week, or in some parts at 7*d.* to 8*d.* a pole. For this he firmly lays and stakes the hedges, binding them down with 'headers' if necessary. These are usually grown on the land. Ash rods are the best, but where there are none to hand the hedge is left as it is, although without them it does not last so long by a year. When pay at the rate of 7*d.* or 8*d.* a pole is given, the ditch is cleaned out as well, and the refuse banked up beside the hedge. The next thing to do is to notice whether there are any bare places on the sward, or if it is deficient in clover; if so a sowing should at once be made, the seed being purchased of a reliable tradesman. This we consider an important matter in all cases in which seed is purchased. After sowing, the manuring should be done; but, as it is improbable that on commencing a tenancy there would be any, we simply add that when manure is to hand it should be evenly distributed over the most desirable spots, afterwards, in succeeding years, dressing each plot in turn. Farmyard manure is the best that can be used, and if at any time a load can be purchased of a neighbouring cottager from his pigstye, as it very often can for 4*s.* or 5*s.*, it should be at once and gladly utilised. Good manure at such a price will always pay its way. But we do not advocate artificial

dressing, unless in a course of years, during which the grass is regularly mown, it receives no manure at all, because none is made on the spot. In that case a dressing as recommended in our remarks on manures may be given. The manuring done, a look-out for moles should be made, and the animals, if any, caught. Some persons advocate their retention, but we are positive that they injure the roots of the grasses as well as prevent it growing on every spot where they throw up a hill after the meadow is laid down for hay. The price paid per mole, usually 3*d.*, will be money well spent with a professional mole-catcher; but a sharp eye must be kept on him, or he may produce more moles when coming for his pay than he has caught on the premises. Another little matter is the lopping of trees. A tenant should take care that his lease does not prohibit this, for two reasons—first because of the value of the wood to himself, and next because in some meadows where there are many trees the lower branches are often so heavily clothed in foliage that the grass grows very scantily beneath them. This is a matter that should be attended to in the early months of the year. If any timber has been cut, the roots, or, as they are called, 'docks,' should be dug out in the winter. During frost, when labour is scarce, numbers of men will in many parts be glad to dig them up and replace the turf neatly for a shilling and the wood—the usual pay, although indeed it is little enough. Some persons

often feed their meadows up to the end of April, but we think it unwise to allow grazing after the end of March; thus in April the land can be harrowed and rolled. These operations can be done by a single horse, and if the meadows are not too rough a bush harrow may be used. This is constructed with bushes and a couple of hurdles chained together, the bushes interlaced in the hurdles, and their fine ends, which should be lengthy, laid so as to form a heavy and broad sweep. Some farmers fasten over the 'tail' or 'brush' of this harrow a heavy piece of wood, to help it to sweep or drag the ground more effectually. If, however, the ground is rough, and requiring a more powerful harrow, an iron chain harrow should be used; but an expensive article of this kind is so little needed on a small farm that, unless it can be bought for about 30*s.* at a sale, it is as well to pay a trifle for its use for a couple of days. The master should walk over the land, and if the harrowing is badly done it should be dragged over the faulty places. The rolling should succeed the harrow, and the kind of roll used will be according to the nature of the soil. On light land a heavy wooden roll will do; on heavy, an iron presser is the best. A good roll is an almost necessary implement where arable land is worked; hence, unless it can be hired when needed at a moderate cost, it is as well to start with a good one. This matter done, women or boys should be set to pick stones and rubbish off the land, and it is then ready for shutting

up. Some farmers make a practice of pulling a horse rake over those meadows which have been manured with dung, unless the weather is too wet. By this means—and the plan is commendable—they collect the straw in a dry state, and to some extent purified, and use it afresh for pig and cowhouse litter. When the grasses are half grown an eye should be kept on noxious weeds, such as hemlock, plantain, &c., and a man set for a day or two to pull them up. The former is a detestable nuisance among hay, its coarse stalks spoiling the value of a whole rick, and if allowed to grow unchecked it will, as it seeds heavily, speedily spread. The latter weed sometimes does more damage still by heating and firing a rick.

When the grass is fit to cut—i.e. when the bents, the tall grasses, are ripe and their seeds almost ready to fall, and the undergrowth at maturity—the weather should be considered and a beginning made. Whether a mowing machine is used or mowers employed is a matter for the master to settle. We can only show him the relative cost of each system. The machine cannot be attempted without two good horses or three fair ones; with these about ten acres can be cut in a day, at times a great consideration, more especially as in that case the man on the farm could drive the machine himself and no extra wages would have to be paid. True the edges of each meadow need a scythe, but this is a trivial matter, and as another man is required to assist in making, &c., he could do that. In case, how-

ever, the grass is mown with the scythe, it will take much longer, few men accomplishing an acre in a day, and will cost at least 6*s.* 6*d.* per acre, most mowers in the cheaper districts requiring 5*s.* 6*d.* per acre and 1*s.* beer money. In districts nearer London where much hay is grown these prices do not rule, higher prices being paid. Twenty acres would therefore cost at least 6*l.* 10*s.* to mow by hand, against a mere nothing on the side of the machine, which can be purchased for a very little more than this sum. Another great point in its favour, which has been already mentioned, is its great value in a wet or uncertain season. Unless the weather is very certain it is not well to cut too much at once, but get one meadow well under weigh for stacking before cutting another. When a meadow, then, is cut, if the sun is powerful, it may at once be turned over in the same form in which it was cut. For this purpose a few women should be employed at 1*s.* a day, the usual wage, and with an additional man it will be quickly got through. If it makes fast it may be raked into 'windrows' or 'hacks;' otherwise it should be once more turned, and so lightly that the wind and air can get through it. If nicely made, when in the 'windrows' it may be converted into cocks ready for carting. The cock is the most convenient position in which to leave dry hay at night, or to place it if rain is expected, as a heavy shower will not penetrate a couple of inches, so that it is easily dried when again

opened into rows. Much care is required to prevent hay being carried too green. There should be a sufficient amount of moisture in it to cause it to heat properly, but if really damp it will mould and spoil or heat so much as to blacken and sometimes fire. In carrying hay one man must be on the cart, with two others to pitch, one on either side, and as the cart is led by the boy between the rows of cocks each man takes a row. In the same way the two men get on the rick, the one building, the other receiving it from the man on the cart and pitching to him We refer of course to a small rick; large ricks need more men. One of the principal considerations is to secure a man who is an experienced builder, and this we would strenuously urge; a bad builder will overlay the bottom, build unevenly, or produce a flat roof, necessitating the cutting off an end in order to make a proper ridge, and thus spoiling both rick and hay. A dry spot should be selected for building, where the ground is a trifle higher than its surroundings and where it will be convenient to put up the fence. The space marked out, a bottom of fagots and wood should be made, and this, covered with refuse hay or straw, will constitute the foundation on which the hay will rest. It is always dangerous to expose a half-built rick, hence there is no better or wiser plan than to use a cloth; this should be hung tentwise over a pole, which is fastened horizontally over the centre of the rick to two uprights, one being

at either end. With such a cloth rain need not be feared for the hay which has been carried. When the rick is built—and care should be taken that it has plenty of slope and no holes in the roof—it should be pulled all over the sides and ends to give it closeness and compactness, and the pulled hay carried to the roof when it is ready for thatching; and the sooner this is done the better. A thatcher will thatch a rick, the produce of twenty ordinary acre crops, for 17*s.* or 18*s.*, making his own pegs, and if straw has to be bought a load will do it well. Should the rick have been very well built, and the slope be as much as possible, it may be necessary to thatch it only half-way down. We have seen full ricks admirably finished in this way, showing a great saving both in labour and straw, without any risk of damage. In estimating the cost of getting the hay up, from cutting to thatching, we have no hesitation in saying that with a machine it should not exceed 8*s.* 6*d.* or 9*s.* an acre; without a machine, at least 5*s.* an acre more. This is for ordinary crops of from 1 to 1½ load an acre; for unusually large crops of, say, 2 loads, the expense might be at another shilling an acre. Should a rick be suspected of firing, it should at once be cut into from the top, and the hot portion reached and taken out. Such an accident is always unfortunate, as it very largely reduces the value of the hay, and the animals at home will refuse all but the best parts of it. In selling old hay, i.e. hay of the year before, makes more money than the new.

The large growers around London usually send to the markets—Smithfield, Whitechapel, or Cumberland market. They have it cut and trussed by experienced men at a cost of 3*s.* to 3*s.* 6*d.* per load (36 trusses of 56 lbs. each). These men trim every truss, and pack it upon the market carts as smartly as possible, when it is drawn to the market during the night, and sold as it stands the next day. Its neat appearance obtains for it several shillings per load more than hay sold in any other manner, hence we do not advise anyone to send hay to these markets who cannot send it in as good condition as these growers do. Some persons send by rail, but the double removal from cart to truck, and back again from truck to the salesman's cart, not only loses weight (and this the salesman never forgets), but it entirely spoils its appearance, and we never knew hay so sent make the top price, in spite of the promises of the salesman, who is about as great an enemy to the haygrower as is every other middleman. If hay is sent by cart, the cost, besides a carter who charges a shilling a mile, is about 5*s.* 6*d.* a load, which includes market dues and commission. If it is sent by rail the carriage will be about 12*s.* within 40 miles, and the salesman charges about 8*s.* With regard to prices, it is never safe to be guided by the quotations in the newspapers; they are invariably much higher than the prices made, and as they are generally furnished by salesmen, the object is clear. The Whitechapel market in London is generally the best

and Smithfield the worst. We would, in concluding this subject, strongly advise anyone growing hay on a small scale for sale, to contrive to get together a private circle of customers; it would pay far better to do this than to consign to any salesman with the certainty of disappointment.

CHAPTER XX.

BEE KEEPING.

IT has been constantly urged that no person living in the country or possessing a garden should neglect to keep bees. Of all mediums of profit they are at the same time the least expensive and the most profitable. Bee keeping can be commenced with an outlay of a few shillings, the investment returning a large profit, and multiplying itself if a little trouble is devoted to the stock. Perhaps the chief reason why bee keeping is not so popular as it might be, is because it is attended with the risk of being stung, but it should be borne in mind that many persons do not suffer from bee stings at all; that at most the pain is not so bad as the prick of a bramble thorn; that persons who are affected by stings become less susceptible after every sting, until in a very short time they cease to regard it at all; that in almost all cases the immediate removal of the sting, squeezing out the acid, and the application of an alkali such as soap or ammonia, will greatly modify the irritation; and lastly, that as soon as the bee keeper learns to master the bees, he renders them almost powerless, or at all

events unwilling to sting him. All persons then who have convenience should keep bees, and they will find that if no more than 30 lbs. of honey is obtained from each hive per annum, they will have gained so much both in profit and instruction.

In Ontario is a Bee farm of 620 hives, which stand in four yards of an acre each. The owner calculates that each hive averages 30,000 bees, and that they will yield him nearly 2,000*l.* for the year. In Germany there are many still more extensive Bee farms, and even in England apiculture is fast becoming a source of extensive profit.

A hive or stock consists of a queen, the only perfect female, drones or males, and worker bees. The queen is the mother of the hive, and she lays about 2,000 eggs daily in spring and the early part of summer; she lives from three to five years. In appearance she is much larger than the other bees, and almost twice as long as a worker, and her wings are much shorter in proportion to her body. The drones, of which there are only a few hundreds in a hive, have no other duty but to propagate their species. They cannot sting, are hatched in early summer, and leave the hive or are killed at the end of the swarming season, unless there is no queen, when the workers retain them. Worker bees build the combs, gather the honey, and rear the young, the hind legs conveying the pollen they collect. They are imperfect or barren females, although they will

sometimes, when the hive is queenless, produce drones. Workers hatch out in twenty-one days from the time the egg was laid ; they become grubs in three days, after which, being fed, they are in six days more sealed in the cells, where they remain for twelve days, when they make their way out as perfect as the bees which have nurtured them. Queen bees are reared from eggs in a similar manner, the course of feeding which the grub undergoes differing materially from that of the worker, and this alone is supposed to be the only difference, the eggs being identical in the first instance. Drones take four days longer to hatch than workers. Workers are hatched in May, and usually die in July, the life of a bee seldom exceeding two months in the working part of the year ; but bees hatched late, and protected well, will live until the following spring if they rest from work.

The comb is made of wax, and consists of a number of cells each having six sides ; the smallest or worker cells are $\frac{1}{5}$ inch across, and the drone cells $\frac{1}{4}$ inch. The comb should not be destroyed when in healthy condition. As it is made in the body of the bee, the process of its manufacture entailing a loss of several times its weight of honey, consequently when it is filled the honey should be withdrawn and the comb replaced for filling. Under the old system the combs are usually crooked and shapeless, and can scarcely be utilised when taken out of the skeps ; but with the more modern hive, the bar frame, the

combs, each nicely built on the frame, can be withdrawn, examined, emptied, and returned at will, not only giving the bee keeper perfect command over his hive, but enabling him to obtain a much larger quantity of honey. Honey itself, of good quality and well marketed, is always in demand, a prominent bee keeper having informed us as we write, that a large firm pays 1*s.* 3*d.* per pound for all he sends, and would take a ton at the price. Honey in the comb is a luxury, and must always sell, hence the means of obtaining it by proper management of bar frames, supers, and sections should be learned by everyone who keeps bees.

The Bee Keepers' Association has done and is still doing good work. It has organised several county societies, which are rapidly extending the knowledge of bee management by the aid of its lecturers, its exhibitions and pamphlets. We cannot urge any more simple and effective method of bee management than that shown in the Bee Tent of the Association. Within is a gauze circle, in which are the bees and the bee-master. He explains the methods of driving, uniting, transferring, &c., at the same time actually doing what he is explaining, so that the dullest person who is interested enough to watch the process, can, if his timidity does not stand in his way, at once pursue these methods for himself. The Bee Tent is a most valuable and instructive addition to any exhibition, and the Association

readily listens to any genuine application for the services of its experts, who twice yearly visit the apiary of each of its members. The honorary secretary is the Rev. Herbert Peel, Abbot's Hill, Hemel Hempstead.

Hives.—The old-fashioned and not to be despised hive, still largely used by the poorer classes, is the straw skep. It is sometimes flat at the top, as in the Pettigrew, sometimes round. The best Pettigrew hives are 14 inches in diameter by 8 in depth. All skeps require a floor board fixed on to a stout stump not more than 2 feet high, and they should be covered by a stout straw hackle, which although not so absolutely waterproof as a pan or metal covering, is much more neat in appearance as well as being warmer. Skeps should always have a hole in the top for feeding and supering. The best skeps we know are the cheap ones made by Neighbours, but now that frame hives can be made so reasonably, and the system of management so readily understood, we cannot advise anyone to fall back upon the skep, however good it may be. The best size of frame hives are made to accommodate the comb in its natural state, allowing for its thickness of about an inch, with space between each bar for the passage of the bees. Thus, to be as accurate as we are permitted to be, the frames are made seven-eighths of an inch wide, allowing a space between of five-eighths of an inch, ten frames making up the

recognised width of a standard hive, viz. 15 inches. It is also 15 inches from back to front, and 8¾ deep, allowing the bees 2,000 inches of space. The frames themselves are made of slight wood, the top piece being the actual width of the outside measurement of the hive, upon which it rests, space being left between the sides of the frame and the inside of the hive for the bees' passage. Each frame is kept in its place by a pin 1 inch in length driven into the ends of the frame, which rest on the front and back, so as to leave five-eighths of an inch of the pin exposed. A frame hive has no lid, but is covered with a thick quilt of carpet made to fit it exactly, a hole being cut in the centre for feeding and supering, this being covered by a small pad of carpet when not used. The hive is, however, covered by a weather-proof sloping roof, made to fit it exactly, and deep enough to cover supers or sections. The floor board of the hive should be flat and smooth, and made to fit it exactly, with an alighting board for the bees in front. In the hive front itself should be an entrance about 6 inches long by a quarter of an inch deep. It should be provided with a sliding perforated zinc door to regulate the size of the opening and close when necessary; over this should be a strip of wood two inches broad, in the form of a porch. Any person desiring to manufacture his own hive, had better procure a good one with the latest improvements, some of which are too nice to be fully in-

telligible unless seen, but he must understand that nothing is more important than that his wood should be good, and the workmanship such as to preclude the possibility of draught or damp. In starting a new frame hive it is necessary to affix guide comb or foundation to the top of each frame, to enable the bees to work properly, otherwise they may build across the frames. This foundation wax can be purchased, or a piece of clean comb may be fixed into each frame, but it should not be more than ½ inch deep. Sometimes beginners have their bees transferred from the skep to the frame hive, and if an expert does this the lesson will not be lost. He first of all smokes the bees to quiet them; the smoke causes them to run to their cells and fill themselves with honey. He then inverts the skep, drives the bees from it into another pinned above it, cuts out the comb into suitable pieces which he ties into each frame with the bees upon them. This finished, and the frames of the new hive fixed in their places, he finds the queen, if she has not already been taken to her new home upon a piece of comb, places her in the frame hive, and then with a smart rap he dislodges and throws all the bees out of the skep into which they were driven upon a white cloth spread on the ground before the entrance to the new hive. They quickly enter their new home and settle down comfortably, but care should be taken not to remove the hive for a week, or the comb may fall out of position.

At the end of that time, however, it will have been affixed properly to the frames, and the tape which held it may then be removed. Two weak stocks of bees may be united in a similar manner, but it must be remembered that two queens cannot live in the same hive, therefore one queen may be caught and put elsewhere, or they may be allowed to fight it out, the victor remaining queen of the united colonies. In order to prevent the two stocks from quarrelling (and strange bees are resented), it is usual to smoke and then sprinkle both lots with thin syrup flavoured with mint or camphor, when, as bees recognise each other by scent only, they cannot distinguish between friends and intruders. It must be remembered that if any of the combs are too thick they must be pared down, or they will perhaps unite with the comb in the next frame. The drone comb should be cut out and the brood placed all together. Should the bees fight when united, plenty of smoke and smart tapping outside will quiet them. It is always a good plan to unite weak stocks. Perhaps a stock has lost its queen when there is little chance of her being replaced, or a cast may be too weak to stand the winter; indeed in any case where a stock is not very strong, it should be united or it will not live. Should two old stocks be united which have stood some distance apart in the same garden, they must be brought together gradually—a yard each on every fine day will be sufficient—or a heavy loss of bees may occur.

The best tempered bees are the Italian, but the most irritable bees are easily overcome by the use of the smoker, which can be purchased for a few shillings, burning rag, paper, or tobacco. When full of honey, bees are not disposed to sting, which is the case when they swarm, and as the smoke frightens them and causes them to fill themselves, they quickly become calm and indisposed to resent anything but actual injury. At this time they may be handled and allowed to crawl over the face without harm, although of course a sting may now and then occur. Timid persons can cover their heads with a gauze veil, fastened over a broad-brimmed hat and tucked inside the coat; they can also use indiarubber gloves, and tie their trousers close over the boots, when little danger is likely to happen to them from the most violent bee. Drones cannot sting; queens never sting unless when fighting each other; and workers, though provided with a sting, forfeit their lives when they use it.

Swarming generally takes place about May, when through the hatching of innumerable young ones the stock grows so large that it is necessary some should leave it. The well-known sign of swarming is the clustering of the bees outside the hive, where they sometimes hang on to the alighting board. At last they start and fill the air with their buzzing, and by degrees they again cluster upon some chosen spot, often the branch of a tree, when they may at once be

hived. This is done by holding the skep, mouth upwards, under the bees, while a smart shake of the branch drops them into it. If the queen is among them all is well, and it may be inverted upon a board, a small block or stone being placed under one side to allow of the admission of the rest; but if the queen is not there they will leave, and cluster as before. If a great portion of the bees are shaken into the skep, or swept in with a goose wing, the chances are that the queen will be there. When the swarm settles upon a small branch it had better be cut off, and if they are shaken sharply off upon a newspaper spread before the skep or frame hive, they will almost always enter it. Swarms will usually stay where they have alighted several hours if shaded from the sun, and then if not succeeded with, they will enter a skep in which a piece of honeycomb has been fastened.

A *cast*, or second swarm, usually takes place eight or nine days after a swarm. Bees generally issue when the queen grubs have been sealed over, and the first hatched of these young queens it is that takes off the cast. Sometimes she, with the assistance of the worker bees, destroys all the other queens about to hatch. Again, if more queens than one hatch at the same time, they may all issue with the cast, but never more than one exists with it, and of course that one the most powerful. Most bee-masters prevent casts, which often weaken a stock and are not always strong enough to live through the winter of them-

selves, by removing the queen cells, all but one, when the swarm has issued ; this of course cannot be done in a skep. It is believed that about 1 lb. of bees numbers 5,000. A first swarm weighs about 3½ lbs., and a cast 2½ lbs. A swarm should be removed to its permanent stand immediately the great body of bees have entered, and the stragglers will find their way to it or to the old hive. If fed at once, they will commence to work all the more vigorously. Should two casts issue, they had better be united on the same evening the second comes out. This is done by shaking the first cast into a hollow in the ground, and immediately standing the skep containing the second cast over it. The method of driving bees must be learnt by all bee keepers, as it is frequently necessary to drive them from their hive into another for permanent or even temporary purposes. It must be remembered that swarms should not be driven, as their combs would be damaged. When it is determined to drive a stock, a smoker must be at hand, also a strong iron skewer, a pair of irons about 8 inches in length with the ends bent at right angles and pointed, a pail and a skep similar in width to the one containing the bees. When all is ready, puff some smoke into the hive ; the bees will at once fill themselves with honey, and if the hive is rapped a few times with a short stick their agitation will be greater. Again smoke them and then invert the hive, placing it in the pail bottom upmost, and on a table. Next place the

empty hive half over the full one, skewering the edges together where the ends of the combs meet the interior of the hive; the empty skep will thus act as a lid half open, the skewer the stiff hinge. To keep it in its place fix the irons one on each side, the four points being pressed into the straw. Now a smart rapping may commence at the bottom, taking care not to rap so hard as to break the combs or shake the bees down as they climb upwards, which they speedily will do, into the empty hive. Should they manifest a desire to go in another direction, give them a puff of smoke. As they pass upwards the queen may be seen and handled, and the bees themselves may be taken up by the handful, or allowed to crawl over the face and hands without harm, the danger to a calm person being very slight indeed.

Supers are receptacles which are usually placed at the top of a hive to obtain the purest honey. Some are of glass, and in these a piece of guide comb must be affixed to the top, or the bees will build from the bottom. In all cases care must be taken to prevent the slightest escape of heat from a super. Many persons now use what are termed 'sections,' frames in which comb is built as in the frame of the hive. These are very convenient, allowing the comb to be removed (and it is very saleable), when they can be replaced and again filled. A section to hold 1 lb. honey is 4¼ inches by 4¼ by 2. If the top and bottom pieces are made a shade narrower, the bees

are enabled to get in, and a piece of glass can be inserted when the section is filled. Care must at all times be taken not to remove honey which has not been sealed over. Honey in the comb, if good, should sell well, but run honey, especially that from skeps, in which brood and other impurities are mingled, will not sell well. Run honey has been offered to us which had been taken from bees stifled with brimstone; the combs had been put into a cloth all together and wrung out, the syrup being most disagreeable in appearance and flavour. In taking comb the brood should be given back to some of the bees to hatch, either by being put within a super or in a frame.

Feeding bees is absolutely necessary in the autumn. Some persons who keep frame hives simply leave so much sealed honeycomb, about two to three frames full, or they transfer it to hives which have none. Others feed their bees with syrup. Other persons again take all the comb they can, and leave the bees to take care of themselves. In this case the chances are that the spring will find them all dead. A skep should weigh at least 22 lbs. to stand the winter, and if on examination about the first week in October, it is short of this weight, feeding should commence. Perhaps there is no better syrup for feeding than that made by boiling 3 lbs. of white soft sugar in three quarts of water, adding a little honey to flavour it. This will help the bees to breed and swarm early; it

strengthens the whole hive, and in every way promotes economy. Feeding should always be at the top. A primitive, though fairly good plan, is to place the syrup in a pickle bottle, over the mouth of which muslin is tied. The bees will consume as much as 3 lbs. in an evening when strong. In the spring feeding must not be forgotten, more especially if the season is late; it stimulates the bees, and pays handsomely in the long run. It is advisable to place a piece of perforated zinc over the hole in the top of the skep on which the feeder is placed. In the case of a bar frame hive, the covering should be two or three thicknesses of carpet called a quilt; in the centre of this a hole is cut, and the zinc placed in a little wooden frame.

Care must be at all times taken to exclude damp from the hives; it is a deadly enemy to bees. Mice should be prevented from entering during winter, and a watch should be kept for wax moths, which quickly monopolise a hive if allowed to lay their eggs. Cleanliness is the best guard against them.

Wintering bees should be seen to in October—feeding having been carefully attended to—the hives cleaned, and the entrance lessened; a straw hackle or covering should be made and put over each. The roofs of wooden hives should be made waterproof, and the hives themselves well painted. Any method which suggests itself to an ingenious man should be adopted to ensure warmth. *Foul brood*, which is the

chief disease to which bees are subject, is a great scourge. The combs are deep brown, and with the grubs within the cells putrid and rotten. As it is infectious, means should be taken immediately it is discovered to destroy it. The bees should be driven into a skep, removed to a dark room, and fed for a couple of days on syrup in which a little salicylic acid (small tablespoonful) has been dissolved. At the end of this time, put them in a fresh hive and feed. The diseased comb should be buried, and the hive, if it cannot be purified, had better be burnt.

When bees are to be removed, and it must be remembered that new comb will not bear a journey, a skep may be inverted and covered over tightly with strainer cloth twice doubled. Frame hives need not be inverted, but will travel safely if a square of perforated zinc is covered over the top instead of the quilt, the entrance hole being closed. New swarms may be removed any distance from a yard to 100 miles, but with old stocks, unless they are sent not less than a mile or two, it is dangerous to remove them more than a yard at once, as the bees invariably return to the old spot, seemingly having no idea to search for their home if it happens to be more than a yard away. It is dangerous to move it on a dull or wet day. If it is necessary to remove a hive with new comb, the bees should be driven and packed in a skep. The comb in the hive may then be supported with folded paper pressed between to keep

them in position, the whole may then be covered with canvas, fastened in a covering of shavings, straw, &c., and tied in a large cloth with handles at the sides,

Should it ever be necessary to introduce a new queen, it had better be done in February. She may be bought of any well-known Apiarian, but must not be introduced to her future subjects too suddenly, or they will kill her. The best plan is to confine her with the workers that come with her in a small cage in the hive for two or three days. Sometimes a Ligurian or Italian queen is purchased; these have orange bands on the body, are very prolific, and especially early breeders.

CHAPTER XXI.

THE HOUSEHOLD.

Home production for home consumption—Produce of the land—Receipts from holding—Expenses—Contrasted with similar expenses in town—Tradesmen—Fuel—Man-servant.

WE have now taken a survey of the entire system of a gentleman's small pleasure farm; not only dealing minutely with the land and the crops, but with labour both manual and mechanical, and with every description of live stock from which pleasure or profit can be derived. A few words may now be usefully devoted to the household, and it must be remembered that, in estimating profit, it is not alone cash received, for in such a house as we are bearing in mind, milk and butter would be supplied at home, pork from homebred pigs, vegetables from the garden. Indeed even the butcher, the baker, and the grocer might be paid with the actual home produce in the manner which is suggested in the following supposed balance sheet. The plan is of a 30 acre holding, tenanted by a gentleman and his family, who will be able to maintain a position equivalent to

that of a London gentleman with three times his income. It is assumed that to start he has a few hundreds of pounds capital.

Country expenses.

	£	s.	d.
Rent and taxes	100	0	0
Butcher as appears below.			
Beer ,, ,,	3	0	0
Milk, butter, bread, flour, vegetables, poultry, eggs, fruit, rabbits, and often game; pork, bacon.	0	0	0
Wine and spirit merchant	25	0	0
Grocery as appears.			
Fishmonger. Coal-merchant	25	0	0
Repairs, renewing furniture, &c.	10	0	0
Physician	10	0	0
Licences. Blacksmith and carpenter	15	0	0
Man-servant in house	20	0	0
Maid-servants	20	0	0
Tailor and draper	50	0	0
Personal expenses, schooling, &c.	100	0	0
Wear and tear, depreciation, &c.	20	0	0
	398	0	0

Town expenses.

	£	s.	d.
Rent and taxes	100	0	0
Butcher and pork-butcher	70	0	0
Beer	15	0	0
Milk, butter, and eggs	40	0	0
Bread and flour	25	0	0
Vegetables and fruit	20	0	0
Game, rabbits, and fish	25	0	0
Wines and spirits	40	0	0
Grocery	60	0	0
Fuel	25	0	0
Repairs, furniture, &c.	20	0	0
Carried forward ...	440	0	0

Town expenses—continued.

	£	s.	d.
Brought forward ...	440	0	0
Physician	20	0	0
Licences. Blacksmith and carpenter	20	0	0
Man-servant and boy	50	0	0
Maid-servants	25	0	0
Tailor and draper	60	0	0
Stable expenses (two horses)	80	0	0
Personal expenses, school, &c.	150	0	0
	845	0	0

It having been supposed that the extent of the land is 30 acres, it is first laid down as follows, the rotation of crops being in the hands of the tenant, who we do not for a moment suppose would fall far short of our design, so far as profit is concerned, in succeeding years :—

	Acres.
Grass, 12 acres, including clover or lucerne	12
Yards and gardens, orchards, &c.	2
Corn, white straws :—wheat 2, barley 3, oats 2	7
Potatoes	3
Mangold and turnips	2
Comfrey 1, cabbage 2	3
Beans or peas	1
	30

In order to arrive at a practical conclusion, it will be necessary to estimate that two horses are kept, stout useful animals, able to plough or draw a four-wheel; also that the farm carries eight cows, besides pigs. A small plot, an acre and a half, may be railed out for the cows and pigs to be turned out in during the days of spring, but they are all essentially stall-fed with hay, straw (chaffed) and grass,

clover, comfrey, cabbage, lucerne, &c., until after hay-making. By this means at least nine acres may be mown, yielding probably fourteen to fifteen loads, or amply sufficient for the home supply, used in conjunction with oat and barley straw. From haytime till winter, the whole of the animals may feed almost entirely out of doors, the clover or lucerne being either given them or made into hay.

The corn crops, which may be followed with roots, clover, &c., should yield as follows. Wheat 10 quarters, or amply sufficient for a family for the year, especially if whole meal bread is eaten. Barley 15 quarters; this will go a long way in pig and poultry feeding, but should be supplemented by Indian corn when it can be purchased at about 28*s.* per quarter. Oats, sufficient for the horses, supplemented with beans, oat chaff, carrots, &c. The beans and peas would also provide pigeons' food, mixed with small maize. Potatoes should yield—well, at least 5 tons to the acre—and if the sorts are choice, they should realise 10*l.* and 12*l.* per ton. The roots, cabbages, &c., would store for the stock for winter.

The profits have now to be considered, and in estimating them we have no intention of wandering into the region of the impossible, merely considering what may be realised by dint of care, attention, and industry, all of which virtues would be blended in one sense of pleasure, in a person pursuing such a course as we are describing.

From Land:—

	£	s.	d.
Potatoes, beyond those consumed and given to stock and seed—13 tons	135	0	0
Butter made from 10 cows, deducting grocery account	100	0	0
Garden produce, fruit, &c.	20	0	0
From pigs, the young being sold at about 8 weeks, 10 sows averaging 16 young per annum, less butcher's bill and those consumed	80	0	0
From fat pigs fed on milk and meal, ten or twelve being annually fatted and sold at Christmas	50	0	0
Calves, an average of 8, sold fat at 6 weeks	30	0	0
Poultry, ducks, and geese	100	0	0
Bees, swarms and honey from 10 hives	10	0	0
Pigeons bred (at first, say)	10	0	0
	535	0	0

Against this the expenses would be somewhere about as follows:—

	£
Interest on capital	20
Decrease in value of stock	10
Labour, besides man	60
Extra corn, maize, &c.	40
	130

Which, deducted from the gross returns of 535*l.*, leaves 405*l.* wherewith to meet estimated household expenses of 398*l.*; but it must be borne in mind that the items almost all are capable of large extension. If, for instance, the calves are allowed to graze through the summer, and are helped on to Christmas with good feeding, they should realise 10*l.* each at little more expense. The pigs' return can be largely increased, and the poultry, conducted according to our advice in

the chapter devoted to it, should return still more, as indeed should the bees and pigeons, but these matters would depend upon the attention devoted to them by the master, who would year by year become more acquainted with their management. Extra labour, too, would enable him to obtain very much more out of the soil for sale than the item for potatoes; indeed we have given him a very wide margin the first year, for certainly he would not require the best part of 30 acres to feed his family and his stock.

Again, the addition of a little more land would materially increase his returns, so long as he did not allow it to lapse into anything beyond him. The whole should be well done, and treated as a vast garden.

We have thus at any rate shown that the same comforts cannot be obtained by an individual residing in a town, even upon double the income; and even then his food is not so fresh and luxurious, nor so perfect and plentiful, as though he resided in the country, where health and spirits are surely so much better at all times.

In roughly drawing the above estimate, the idea only is conveyed; it is of course for the tenant to sell his pigs and calves to whom he pleases; if he sold sufficient to the butcher annually to cover his bill, all well, if not the result would not be altered. The estimate of town versus country is not drawn to show a

profit, but merely for comparison of expense. In the same way barley may be exchanged for malt, or sold, and the malt and hops purchased; the sum of 3*l.* allows for the difference between the two. So it is with the grocery account; presuming that the butter is sent to a grocer, he would have no account to render, but rather a heavy one to pay.

Fuel would in a great degree be provided on the premises, but coals purchased should be by the truck, and carted from the nearest station; thus at least 5*s.* a ton will be saved in the country, besides which a truck contains as a rule 22 cwt. to every ton. A trusty man-servant would take charge of the gardens and stables, being supervised by the master and assisted by a handy lad, who should work with him as much as possible. He should live in the house, so as to be at all times at hand. A trustworthy man is of immense value, and if he were treated as one of the fixtures, and identified with the place, he would take an interest in all the proceedings; preventing waste of food, helping in the hay-making, sowing, planting, hoeing, and harvesting; driving the family out, teaching the young members to ride, assisting them in ferreting, ratting, &c., and in fact continually turning his attention to whatever required his hand.

Children bred in such a home rarely live to starve; they acquire robust health, an aptitude for turning their hands to anything, even though they are brought up to a certain business or profession. They

put to shame the young men of our towns, whose acquirements are as a rule limited to the ability to smoke, or drink or bet. They can ride fearlessly, handle a gun or a fishing-rod, play a lively game of cricket, or take a hand at tennis. Their knowledge combines the knowledge of a townsman with a complete knowledge of the country, that country so much admired by all men, but understood by so few. How many men are there, not bred in the country, who, driving into it in spring, can name one quarter of the growing crops they see, or one tenth of the trees beneath which they pass? To the country bred, vegetation is a household word; the plane, the elm, the ash, and the oak are as familiar as the first lesson in the alphabet; the birds of the air, and the beasts of the field, from the timid field mouse to the vixen which steals his poultry, are as well known to him as his home, and their haunts and habits as easily indicated.

CHAPTER XXII.

MISCELLANEOUS.

Recipes—Wheat produce—Cake—Gestation table—Seed table—Plant table—Milk analysis—The Sun-flower—Manure table—Moles—Insects—A hay sweep—To form a lawn—Tree-planting table—Contract price table—London market measure table—To measure land.

Cattle foods.—Good upland hay, cut just before ripening, is easily digested and contains a good percentage of nourishment; but as it grows the nitrogen decreases and the woody substances increase, reducing its value considerably, nor is it so palatable to stock. Good hay should be a rich brown, fine, free from hemlock, docks, and all coarse plants or fibrous grasses; it should have a delicious aroma and be eaten by the stock with a relish. Clover hay is a most excellent fodder; poor hay, straw, &c. may be utilised by mixing other foods with them, such as bran, pulse meal, and cake, these being rich in the albuminoids of which the bad hay and straw are almost destitute. Cotton cake, linseed cake, and palm nut meal are all valuable additions to the diet of stock; they enrich poor fodder and make it useful, and they are also first-rate manure makers.

Straws have not much nourishment eaten alone, but chaffed and combined with good meal or cake, they are not to be despised. Oat straw is the most valuable of any, 100 lbs. containing 42 lbs. of digestible matter, against 50 lbs. from the same quantity of hay, although the actual value as fodder would not be worth so much. Bean and pea straw are wasted far too much; they should be chaffed, given to stall-fed animals, green if possible, instead of being trodden under foot as they usually are. It is most difficult to enforce these matters upon the men on a farm, who seem to have a wholesome dread of the chaff-cutter, but it is a machine that saves an immense amount of food from being wasted, and is a great help to the cattle.

Oatmeal is a splendid food for stock, especially for young, and we are surprised that farmers do not have their crops of oats milled for feeding. A good sample, weighing 40 lbs. to the bushel, will produce 13 stone per quarter of meal.

Charlock.—This vexatious weed should be pulled up by the roots when young; a man with a few lads will clear a few acres in a day.

Smut in wheat.—To prevent this, dissolve 1 lb. of blue vitriol in boiling water, and then add 3 gallons. This will be sufficient for 1 quarter.

Damaged hay may be rendered available by cutting into chaff and dressing with molasses and water.

Pig-floor.—The best composition for this is six parts gravel, three sand, and one cement, mixed dry and then made into mortar. It may then be laid 3 inches thick over a prepared floor.

Wheat produce.—If grown from single grains planted 1 foot apart, under the most favourable conditions it will produce 10 ears with 50 grains in each, or five hundred-fold. One bushel to the acre, 624,000 grains, gives 10 inches to each grain, or 14 to the foot, or 132 to the square yard.

A good hedge may be made of beech trees grown cross-wise. It is very hardy, and as the leaves hang all the winter it is dense and warm for the shelter of stock.

Feeding cake.—Decorticated cotton cake should be sweet, fresh, and a bright yellow, the black shell having been removed. If not decorticated, it should be fine and unadulterated. Linseed cake may be tested by mixing 200 grains with 8 oz. of water, and if pure it will form a jelly. The cake should be hard and dry, and not mould so quickly as when adulterated. The latter is too common, and though harmless is almost useless.

To preserve wooden buildings.—Mix two parts of tar, one of pitch, half of resin; boil, and paint the wood when quite hot. Give two coats, well sanding with the last.

To prevent damp rising in walls, make a dry course of slate above the level. Pantile or slate the roof.

Periods of Gestation.

	Minimum	Average	Maximum
	days	days	days
Mare	330	340	420
Cow	240	285	330
Sheep and goat	135	144	160
Sow	110	120	130
Bitch	55	60	70
Cat 50 days			
Rabbit 1 month			

Seeds per acre.—Drumhead cabbage 1 lb.; carrot 9 to 12 lbs., clover 15 to 16 lbs., lucerne (drilled) 16 lbs., otherwise a little more; sainfoin 5 bushels, tares 2½ bushels, kohl rabi 4 bushels (drilled), turnip 4 lbs., mangold 5 lbs., parsnip 10 lbs., rape 1 peck, rye 2½ bushels, rye grass 2½, linseed 2½, furze 20 lbs.

Garden seeds for various areas.

Asparagus, bed of 15 square yards	1	pt.
Beans, Broad, row 80 feet	1½	qt.
Beet, row 50 feet	2	oz.
Broccoli, 4 square yards	1	,,
Brussels sprouts, 4 square yards	1	,,
Cabbage, bed of 8 square yards	1	,,
Carrots, drill of 120 feet	2	,,
Carrots, bed of 12 square yards	2	,,
Cauliflower, 4 square yards	1	,,
Celery, 4 square yards	1	,,
Cress, 3 square yards	2	,,
Endive, 4 square yards	1	,,
Kale, 4 square yards	1	,,
Kidney Beans, row 80 feet	1	pt.
Leek, 2 square yards	1	oz.
Lettuce, 4 square yards	1	,,
Mushroom, 7 square yards	1	bus.

Garden seeds for various areas, cont.

Onions, 9 square yards	2 oz.
Parsley, row 80 feet	1½ ,,
Parsnip, drill of 200 feet	2 ,,
Peas, early, row 60 feet	1½ pt.
Peas, large, late, row 80 feet	1½ ,,
Potatoes, row 30 feet	½ pk.
Radishes, 4 square yards	1½ oz.
Savoy, 4 square yards	1 ,,
Spinach, 10 square yards	2 ,,
Spinach, drill of 120 feet	2 ,,
Turnip, 4 square yards	1 ,,

Plants per acre.

Feet apart		Feet apart		Feet apart	
1	43,560	2	10,890	3	4,840
4	2,722	5	1,742	6	1,210
7	889	8	680	9	537
,,	,,	,,	,,	10	435
15	193	20	108	25	49
,,	,,	,,	,,	30	39

Constituents of milk.

	Cow	Woman	Ass	Goat	Ewe
Casein	4·48	1·52	1·82	4·02	4·50
Butter	3·13	3·55	1·11	3·32	4·20
Sugar	4·77	6·50	6·08	5·28	5·00
Salt	0·60	0·45	0·34	0·58	0·68
Water	87·02	87·98	90·65	86·80	85·62

The sunflower.—This useful plant may be at all times grown advantageously. The flowers contain a large quantity of honey, and are most attractive to bees, and the seeds are much relished by poultry. According to M. Grunert, the seeds yield a large

percentage of fine oil; the residue, leaves and cut stalks, being eaten by cattle. The fresh flowers just before full bloom furnish a dish scarcely inferior to the artichoke. The seeds ground into flour make very good cakes, and if roasted furnish a drink not much inferior to cocoa. Boiled in alum they make a a good blue colouring matter. The leaf is used as tobacco, the seed pods made into blotting paper, and the plants, if grown in damp places, for they will grow anywhere, are a protection against intermittent fever.

Heaps of dung to the acre.

Heaps to the load	2	4	6
yards apart			
6	67	33	22 } heaps
8	37	18	12 } per acre

The Lincolnshire Farmers' Association (Mr. C. E. Bissell, Sleaford, secretary) was formed to supply farmers with phosphates at a minimum price and in a state of purity. At the time we write the price is about 70*s.* per ton. The entrance is free, and the subscription is 2*d.* per acre in occupation. There are no less than 1,100 members.

The Royal Agricultural Society of England; secretary, Mr. H. M. Jenkins, Hanover Square, London. The privileges enjoyed by members are chiefly under three heads. Veterinary advice, chemical analysis, and examination of plants, seeds, and insects. Under

these heads much good has been done, more especially in the stamping out of disease among stock, and the exposure of adulteration of foods and manures.

The Poultry and Farm Produce Society, Limited, has been formed to enable country residents to dispose of their produce without the loss and trouble entailed by dealing with middlemen. The shareholders are numerous and highly respectable. The secretary is Mr. John Buchanan, and the temporary office Messrs. Christy's, 155 Fenchurch Street.

Sulphuring seed.—One of the safest plans in sowing any kind of seed is to mix it with sulphur—about 1 lb. to 12 lbs. of seed. It seems to impart a vigour, and effectually keeps away parasites. The sulphur may be fearlessly mixed with the seed and sown with it.

The best periodicals devoted to agriculture, live stock, and gardening are 'The Garden,' 'The Agricultural Gazette,' 'The Live Stock Journal,' 'The American Agriculturist,' 'The Farmer,' 'The Bazaar,' 'Mark Lane Express.' The 'Journal of Horticulture' also deals with gardening, poultry, and bees. The 'Farm Journal,' and 'Gardening,' are the cheapest weekly periodicals (1*d.* each). The 'Stock-Keeper' also deals with poultry, pigeons, dogs, and bees. 'The Dairyman' with the dairy.

To catch moles.—The simplest method now adopted is to use the sixpenny iron traps, which are

not only cheap but effectual. The main run is found and opened with a piece of stick, taking care not to let the hands touch the earth, as the mole's scent is strong. Insert the trap so that it maintains a free route along the gallery, or run, and cover with a sod. The mole, running along, springs the trap and is caught by the body. Another good plan is to take two old beer bottle necks, and set them in the run, end to end, leaving the wide ends outermost. Some sticks must be used to fasten them firmly in their place, and when covered with a turf or two, to exclude light, the trap is set. The mole, endeavouring to squeeze through the glass necks, gets stuck fast and cannot extricate itself. This snare is as old as it is simple.

Garden insects and their destruction.—Greenfly, known to so many who have gardens, may be destroyed by the fumes of tobacco or a drenching of tobacco water. This fly, if left untouched in summer, will remain upon the branches the winter through, and bring forth its young the succeeding year. The best plan, therefore, is to syringe the trees in the autumn and winter with strong soapsuds. This entirely does away with them for the future, and may be applied for the destruction of caterpillars in the same way.

Slugs and snails ought to be picked up early in the morning, about four, when they emerge from their hiding places, and put in a vessel of strong salt and water.

Wireworms can be caught in gardens by placing slices of carrot, turnip, parsnip, or potato beneath the surface, staked down by a skewer. If frequently taken up, the pests will be found adhering. On arable, after rolling, sow 3 to 4 cwt. of salt per acre on light soil—less on heavy.

Worms, which do a deal of damage in some gardens, may be best caught at night by the aid of a lantern ; they must be laid hold of by the finger and thumb lightly, and put in a can or some deep vessel, and afterwards destroyed. A little trouble will enable anyone to catch large numbers in this way.

Caterpillars are one of the greatest pests in a garden, devouring as they do the gooseberry and currant bushes, cabbage, &c. The best plan is to mix up a quantity of turpentine and water to sprinkle the bushes with. In order to make the turpentine mix well, some fine mould must be mixed with it, and the water added to the required consistency. It need not be very strong, but a fair sprinkling from a can with a good rose on the spout will kill them, or prevent them doing further damage. Tar water is also said to be effective, but we have not tried it. It is, however, effective against greenfly, woodlice, and ants ; and tar itself, painted on fruit trees, prevents their being barked by hares and rabbits.

A hay sweep.—This American invention is one of the most useful implements on a farm, and can be made by any handy carpenter. A gate is made of

quartering, 4 × 5 inches and 10 feet long, one main rail top and bottom, 3 feet apart, connected by 7 upright bars, 1 × 2 inches, and 3 feet long. Flat teeth 1½ × 4 inches and 5 feet long, or projecting 2½ feet each way, run through the bottom bar, and form a rake for either side, the ends being tapered to enable them to run under the windrows. At each end is a gate on hinges; these are 3 feet long, and consist of bars of wood 3 inches square, united by 2 bars of 1 × 2 inches, and a third at the bottom 3 inches square, and tapering upwards. To the ends of these gates the whippletrees are attached a little above the middle; two horses, one to each, a boy attending each horse. When at work the horses pass on each side of the windrows, the rake or sweep gathering up the hay as it is drawn along. In this way a load of 8 or 10 cwt. is quickly drawn to the rick; the horses are then turned round, the gates swing back, and the back of the rake becomes the front, leaving the load behind as it is drawn away.

Forming a lawn.—Mr. Shirley Hibberd's admirable publication gives the following formula for the formation of a lawn, or cricket or tennis table.

The importance of properly forming ground is very rarely sufficiently recognised. The other day we saw a croquet ground in the course of formation. To get the proper level, nearly 2 feet deep of soil had to be taken from the top part of the ground, to be filled in at the bottom. A person who understood

the work would have filled in the loose soil in layers 4 inches or 6 inches thick, and then rammed and consolidated it as the work proceeded. But as the operator thought he knew better than that, he wheeled the soil into its place to its full thickness, and having levelled it roughly, passed the garden roller over it several times, and having given the surface a smoothing with the rake, proceeded to lay the turf. What will be the consequence? Just this: when the rain comes, the turf in the soil will decay, and the whole will subside into a series of miniature pitfalls, rendering it useless as a croquet ground, and necessitating the renewal of the work. Now in the formation of a croquet, cricket, or bowling ground, or even the formation of a lawn or flower garden, it is necessary that the ground should be removed to a uniform depth, and if not, it is indispensable that the soil in every hole should be properly rammed until it is brought to the proper surface level. In this manner the turf will have a smooth and proper foundation, and without that it is a waste of time to lay the turf at all. Soils differ much in the amount of compression which they require. Land free from vegetable matter will, after a good soaking rain, go together so closely as to need but little further compression, but fresh soil full of fibre will rot and settle for years if it be not thoroughly consolidated at the commencement of the work. Loamy soils can easily be properly handled when they are dry. If you

attempt to ram them when they are wet, you will form a plastic mass, through which the rain will pass with difficulty, and hence the surface will always be damp and mossy; but if you ram such a soil when it is in a comparatively dry state, you may make it solid, and yet the interstices between the particles of soil will be sufficient to allow the surface water to escape with facility.

Table for planting fruit trees.

Standard pears on pear stocks, for orchards—25 feet apart.

Pyramidal pears on pear stocks, not root-pruned—20 feet apart.

The same root-pruned—10 feet apart.

The same on quince stocks, not root-pruned—6 feet apart.

The same on quince stocks, periodically lifted—4 feet apart.

Bush pears on pear stocks, periodically lifted or root-pruned—6 feet apart.

Bush pears on quince stocks, periodically lifted—4 feet apart.

Pears on pear stocks, trained horizontally on walls or espaliers—18 feet apart; the same to be root-pruned as occasion may require.

Pears trained in vertical, oblique, or horizontal cordon fashion may be planted, if upon walls, 18 inches apart, or more or less as the taste of the planter may dictate.

Pears trained in horizontal cordon, to form edgings to walks or quarters of the garden, should be planted on stems 1 foot high, and trained along galvanised wire, strained and supported on iron pins, a single shoot only being made use of.

Pears trained fan shape and root-pruned—15 feet apart. The above distances will also do for apples, cherries, and plums; these last, when trained as pyramids, require to be grown with stems 18 inches to 2 feet high, as, if cut shorter, they will throw out so many strong branches just above the junction of the graft and stock, that it will be found, with the greater number of sorts, so much cutting will require to be done that the trees will gum and die, and present great difficulty to form them into nice pyramids.

Peaches, Nectarines, Apricots, Plums, and Cherries, when planted against walls are generally, and best, trained fan shape, and should be

from 12 to 15 feet apart, and kept periodically lifted and replanted on the surface, merely covering the roots with a few inches of the soil.

Bush trees of pears on quince, apples on the paradise, cherries on the Mahaleb, and plums may be planted about the same distance apart as gooseberries and currants, i.e. 5 feet apart in the rows and 5 feet from row to row. They should be lifted biennially, or as often as required, in November, and they will then form a charming fruit garden.

Prices of contract work.

		s.	*d.*		*s.*	*d.*
Felling oak timber	per ton of 40 ft.	3	0	to	0	0
,, other hard wood	,, ,,	2	6	,,	0	0
,, fir timber	,, ,,	1	8	,,	0	0
Grubbing out timber	,, ,,	4	6	or	1	0
		[and the wood				
Cutting underwood, 12 to 15 years' growth	per acre	9	0	to	10	0
Turning ,,	,, per score perches	1	0	,,	1	6
Making hurdles (wattle)	per doz.	3	6	,,	4	0
,, Welsh hurdles for sheep (split ash)	,,	4	0	,,	5	0
,, ,, for cattle	,, ,,	5	0	,,	6	0
,, faggots	per 100 of 6 score	5	0	,,	0	0
,, oven faggots	,, ,,	3	0	,,	0	0
,, small faggots for fire lighting	,, ,,	1	3	,,	0	0
Cutting bonds for tying large faggots	,, ,,	0	4	,,	0	0
Getting out hurdle rods	per score	0	1	,,	0	0
,, hurdle stakes	per doz.	0	1	,,	0	0
,, spade stems	,,	0	1	,,	0	0
,, spick gads for thatching pegs	,,	0	1	,,	0	0
,, Dahlia stakes	,,	0	1	,,	0	0
,, Rose stakes	per 2 doz.	0	1	,,	0	0
,, broom handles	,,	0	1	,,	0	0
,, kidney bean stakes	50 in a bundle	0	2	,,	0	0
,, pea wood	per bundle	0	1	,,	0	0
,, birch wood for besoms	,,	0	1	,,	0	0
Stripping oak bark	per ton	21	0	,,	0	0
Loading ,, on waggons	,,	3	0	,,	0	0
Chopping ,,	,,	8	0	,,	10	0

Fencing materials.

		s.	*d.*		*s.*	*d.*
Getting out and mortising 4-holed posts	per score	4	0	to	0	0
,, ,, 3 ,,	,,	3	0	,,	0	0
,, ,, 2 ,,	,,	2	6	,,	0	0
,, ,, 1 ,,	,,	2	0	,,	0	0
Getting out and cleaving rails	,,	0	10	,,	0	0
,, ,, stakes	,,	0	6	,,	0	0
Getting out and cleaving long pales	,,	0	6	,,	0	0
,, ,, short ,,	,,	0	4	,,	0	0
Fixing 4-rail mortised fence	per chain	3	6	,,	0	0
,, 3 ,,	,,	3	0	,,	0	0
,, 2 ,,	,,	2	6	,,	0	0
,, 1 ,,	,,	2	6	,,	3	0
Hanging field gate		4	0	,,	0	0
,, half ,,		2	6	,,	3	0
Fixing stile		2	0	,,	0	0
Getting out and cleaving posts, rails, and pales for tree guards	per set	0	9	,,	0	0
Fixing and cleaving posts, rails, and pales		2	0	,,	0	0
,, deer park fencing		7	0	,,	8	6
Sawing hard wood	per 100 ft.	4	0	,,	4	6
,, soft ,,	,,	3	0	,,	2	0
Making bank for quick hedge 4½ ft. wide at bottom, 2½ feet at top, and 15 or 18 in. high, digging ditch (36 in. wide at top, 30 in. deep, and 9 in. wide at bottom), and planting quicks,	per chain	7	6	,,	8	6
Hedge without bank or ditch, trenching ground, preparing bed and planting	per chain	3	0	,,	4	0
Laying hedge and scouring out ditch	,,	2	4	,,	2	10
Pipe draining, mains 4 ft. 3 in. deep, 4 to 6 in. pipes	,,	2	9	,,	3	6
Pipe draining, small, 4 ft. deep, 1½ to 2½ in. pipes	,,	2	0	,,	2	9
Pipe draining, small, 3 ft. 6 in. deep, 1½ to 2½ in. pipes	,,	1	9	,,	2	6
Open ditching mains, or for drying wood rides, 36 in. at top, 30 in. deep, and 9 in. at bottom	,,	3	0	,,	4	0
Scouring out ditto	,,	0	9	,,	1	6

Fencing materials—continued.

Small open ditches, 15 in. to 18 in. wide at top, 12 in. to 15 in. deep, and 9 in. wide at bottom	per chain	1	6	to	2	6
Scouring out ditto	,,	0	6	,,	0	9
Digging holes for forest planting, 12 in. to 15 in. square, and 9 in. to 12 in. deep	per 100	1	6	,,	2	0
Digging clay	per yard	0	5	to	0	6
Cleaving firewood	per cord	5	0	,,	0	0
,, charcoal wood	,,	2	6	,,	3	0
Burning charcoal	per bushel of 20 lbs. weight	0	3	,,	0	0
Trimming hedges (full sized)	per chain	1	0	,,	1	6
,, and cleaning young hedges	,,	0	6	,,	1	0
Digging holes for ornamental or specimen trees, 5 ft. to 6 ft. square, and 2 ft. deep	each	0	2	,,	0	3
Loading and spreading soil or manure	per cartload	0	2	,,	0	3
Sawn larch fencing (creosoted) including materials and fixing:						
4-rail mortised fence	per chain	40	0	,,	45	0
3 ,, ,,	,,	35	0	,,	40	0
3 ,, ,,	,,	30	0	,,	35	0
1 ,, ,,	,,	20	0	,,	25	0
6-wire fence larch posts	,,	35	0	,,	40	0
Sawn oak field gate, 5-barred, including posts, iron-work, and fixing		55	0	,,	60	0
Sawn half gate		35	0	,,	40	0
,, stile		15	0	,,	18	0
Sawn oak (creosoted) deer park fence, with upright pales, 4 ft. 6 in. to 5 ft. 6 in. high	per chain	90	0	,,	100	0
Tree guards, 5 ft. 6 in. high, sawn larch, 3 posts, 5 upright pales on each side, 3 crossbars do., nails, and fixing, each, complete		12	0	,,	15	0

The prices vary a little in different parts of the country.

Table of Measures used in London Markets.

These being made either of wickerwork or deal shavings, vary triflingly in size more than measures made of less flexible materials.

Sea-kale Punnets. Eight inches diameter at the top, and seven-and-a-half inches at the bottom, and two inches deep.

Radish Punnets. Eight inches diameter, and one inch deep, if to hold six hands; or nine inches by one inch for twelve hand

Mushroom Punnets. Seven inches by one inch.

Salading Punnets. Five inches by two inches.

Half Sieve. Contains three-and-a-half imperial gallons. It averages twelve-and-a-half inches in diameter and six inches in depth.

Sieve. Contains seven imperial gallons. Diameter fifteen inches, depth eight inches. A sieve of currants twenty quarts.

Bushel Sieve. Ten-and-a-half imperial gallons. Diameter at top seventeen inches and three quarters, at bottom seventeen inches; depth eleven inches and a quarter.

Bushel Basket. Ought, when heaped, to contain an imperial bushel. Diameter at bottom ten inches, at top fourteen inches and a half: depth seventeen inches. Walnuts, nuts, apples, and potatoes are sold by measure. A bushel of the last-named, cleansed weighs 56 lbs., but 4 lbs. additional are allowed if they are not washed. A junk contains two-thirds of a bushel.

Pottle. Is a long tapering basket that holds rather over a pint and a half. A pottle of strawberries should hold half a gallon, but never holds more than one quart; a pottle of mushrooms should weigh one pound.

Hand. Applies to a bunch of radishes, which contains from 12 to 30 or more according to the season.

Bundle. Contains 6 to 20 heads of broccoli, celery, &c., sea-kale 12 to 18 heads; rhubarb, 20 to 30 stems, according to size; and of asparagus from 100 to 125.

Bunch. Is applied to herbs, &c., and varies much in size according to the season. A bunch of turnips is 12 to 25; of carrots 15 to 40; of greens as many as can be tied together by the roots.

Grapes are put up in 2 lb. and 4 lb. punnets; new potatoes, by the London growers, in 2 lb. punnets. Apples and pears are put up in bushels, sieves, or half sieves. A hundredweight of Kentish filbert is 100 lbs. Weights are always 16 oz. to the pound.

Measuring land.

Gunter's Chain consists of 100 links, measuring 66 feet, equal 22 yards, equal 4 poles in length.

62,726	sq. inches	equal	1	sq. link
2,295	,, links	,,	1	,, foot
20,661	,, ,,	,,	1	,, yard
625	,, ,,	,,	1	,, pole or perch
40	,, poles (pchs.)	,,	1	,, rood
4	,, roods	,,	1	,, acre
10	,, chains	,,	1	,, ,,

Scotch land measure.

346	sq. feet (English)	1	sq. fall
14	,, falls	1	chain English
2½	Gunter's chains	1	sq. rood
4	roods (6,150½ yards)	1	,, acre

An Irish acre is equal to 1 acre 2 roods 10¼ poles.
A Welsh acre is equal to 2 English acres.

30¼ sq. yards make 1 sq. rod; 40 sq. rods make 1 sq. rood; 4 sq. roods, 1 acre; 640 acres, 1 sq. mile; 4,840 sq. yards, or 160 rods, make 1 acre. In measuring an acre by yards, the usual practice is to trace off 70 yards in length and 70 yards in width. This, in a rough way, may be considered near enough for practical purposes; but as 70 yards either way make 4,900 sq. yards, it exceeds 1 acre by 60 yards. To determine an accurate acre, it may be measured 70 yards in length by 69 1-7th yards in width. The same result may be arrived at by measuring 220 feet in length and 198 feet in width, or by measuring 73¼ in length by 66 yards in breadth.

	Sq. yards.
Statute acre	4,840
Leicestershire	2,308¾
Herefordshire	3,226⅔
Wiltshire	3,630
Devonshire	4,000
North Wales (customary)	3,240
,, (erw)	4,320
Cornish	5,760
Cunningham	6,250

	Sq. yards.
Westmoreland	6,760
Irish	7,840
W. Derby	9,000
Cheshire	10,240
Scotch	6,150

English mile equal to 1,760 yards; Scotch mile equal to 1,984 yards; Irish mile equal to 2,240 yards.

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